

University of Mississippi

eGrove

Honors Theses

Honors College (Sally McDonnell Barksdale
Honors College)

2017

Evaluation of a Farmers' Market Intervention on Food Insecurity, Health, and Diet of Individuals Living in Rural, Appalachian Mississippi

Heather A. Poole

University of Mississippi. Sally McDonnell Barksdale Honors College

Follow this and additional works at: https://egrove.olemiss.edu/hon_thesis



Part of the [Nutrition Commons](#)

Recommended Citation

Poole, Heather A., "Evaluation of a Farmers' Market Intervention on Food Insecurity, Health, and Diet of Individuals Living in Rural, Appalachian Mississippi" (2017). *Honors Theses*. 378.

https://egrove.olemiss.edu/hon_thesis/378

This Undergraduate Thesis is brought to you for free and open access by the Honors College (Sally McDonnell Barksdale Honors College) at eGrove. It has been accepted for inclusion in Honors Theses by an authorized administrator of eGrove. For more information, please contact egrove@olemiss.edu.

EVALUATION OF A FARMERS' MARKET INTERVENTION ON FOOD
INSECURITY, HEALTH, AND DIET OF INDIVIDUALS LIVING IN RURAL,
APPALACHIAN MISSISSIPPI

by
Heather Poole

A thesis submitted to the faculty of The University of Mississippi in partial fulfillment of
the requirements of the Sally McDonnell Barksdale Honors College.

Oxford
May 2017

Approved by

Advisor: Dr. David Holben

Reader: Dr. Yunhee Chang

Reader: Dr. Teresa Carithers

Copyright © 2017
Heather Poole
ALL RIGHTS RESERVED

ABSTRACT

Objective: This study examined: 1) the impact of a farmers' market nutrition education and incentive intervention on household adult food security status, produce intake, perceived diet quality, and perceived health of individuals living in rural, Appalachian Mississippi; and 2) the relationship of household adult food security status to produce intake, perceived diet quality, and perceived health at baseline.

Methods: Participants were recruited for a 12-week farmers' market nutrition education and incentive (\$3.00/week) intervention at two rural farmers' markets in an economically distressed, Appalachian Mississippi county and completed pre- and post-intervention surveys.

Results: The mean age of participants (n=60) was 57 years (*SD*=13 years). Participants were predominately white (n=51, 85%), female (n=51, 85%), married (n=36, 60%), with some college or higher education (n=40, 66.7%), and food secure (n=47/56, 83.9%). Sixty-five percent of participants (n=39) completed both pre- and post-intervention surveys. The intervention did not significantly impact household adult food security status (scale score) [pre, MEAN=0.590 (*SD*=1.545); post, MEAN=0.492 (*SD*=1.470)] (p=.344), vegetable intake [pre, MEAN=2.3 servings (*SD*=0.9 servings); post, MEAN=2.5 servings (*SD*=1.0 servings)] (p=.242), and fruit intake [pre, MEAN=1.6 servings (*SD*=0.9 servings); post, MEAN=1.7 servings (*SD*=0.9 servings)] (p=.244), total produce intake [pre, MEAN=3.9 servings (*SD*=1.4 servings); post, MEAN=4.2 servings (*SD*=1.5 servings)] (p=.071), perceived diet quality (p=.135), and perceived health (p=.285). At baseline, food insecurity was significantly related to only perceived diet quality ($\tau_{b}=-0.250$, p=.039).

Conclusion: A farmers' market nutrition education and incentive intervention was not effective in improving household adult food security status, produce intake, perceived diet quality, and perceived health of individuals living in rural, Appalachian Mississippi. However, household adult food insecurity status was associated with poorer perceived diet quality of participating adults.

DEDICATION

To my family, who is my constant encouragement.

ACKNOWLEDGEMENTS

I would like to give the following entities my deepest gratitude:

To my thesis advisor, Dr. David H. Holben, who tirelessly guided me through this entire process;

To my second and third readers, Dr. Yunhee Chang and Dr. Teresa Carithers, for their contributions and edits;

To the Chambers of Commerce in Calhoun County for their support during the implementation of this project;

To the Catalyzing Entrepreneurship and Economic Development Initiative Summer Research Grant provided by the Hearin Foundation, whose generous financial support made this study possible; and

To the Sally McDonnell Barksdale Honors College, who helped provide me a wonderful undergraduate experience.

TABLE OF CONTENTS

	ABSTRACT
	DEDICATION
	ACKNOWLEDGEMENTS
	LIST OF TABLES
	LIST OF FIGURES
	LIST OF ABBREVIATIONS
I.	INTRODUCTION
II.	REVIEW OF LITERATURE
III.	METHODS
	A. Location
	B. Participants
	C. Procedures
	D. Measures
	E. Data Analysis
IV.	RESULTS
V.	CONCLUSIONS
	REFERENCES
	APPENDICES

LIST OF TABLES

Table 1	Research Questions and Null Hypotheses of the Study.....	14
Table 2	Variable Definitions and Measurements.....	24
Table 3	Research Questions and Statistical Measures for the Study.....	26
Table 4	Demographic Characteristics of Participants Prior to the Intervention.....	27
Table 5	U.S. Household Adult Food Security Status of Participants Prior to the Intervention.....	29
Table 6	U.S. Household Adult Food Security Status of Participants Completing Both Pre- and Post-Intervention Surveys.....	29
Table 7	Produce Intake (in servings) of Participants Prior to the Intervention.....	30
Table 8	Produce Intake (in servings) of Participants Completing Both Pre- and Post-Intervention Surveys.....	30
Table 9	Perceived Diet Quality and General Health of Participants Prior to the Intervention.....	31
Table 10	Perceived Diet Quality and General Health of Participants Completing Both Pre- and Post-Intervention Surveys.....	31
Table 11	Relationship of Food Insecurity to Produce and Health-Related Factors in Participants Prior to the Intervention.....	33

LIST OF FIGURES

Figure A Appalachian Regional Commission Counties Map.....23

LIST OF ABBREVIATIONS

USDA – United States Department of Agriculture

SNAP – Supplemental Nutrition Assistance Program

EBT – Electronic Benefit Transfer

WIC – Women, Infants, and Children

FMNP – Farmers’ Market Nutrition Program

CHC – Cultivating Healthy Communities

CPS – Current Population Survey

HHS – U.S. Department of Health and Human Services

NHANES – National Health and Nutrition Examination Survey

SFMNP – Senior Farmers’ Market Nutrition Program

ACS – American Community Survey

ERS – Economic Research Service

ARC – Appalachian Regional Commission

IRB – Institutional Review Board

T2DM – Type 2 Diabetes Mellitus

I. INTRODUCTION

Food insecurity is related to poor diet quality and chronic disease risk and prevalence in the United States (Dixon, Winkleby, & Radimer, 2001; Holben, 2010). Food insecurity is defined as the household-level economic and social condition of limited or uncertain access to adequate food; hunger is a potential consequence of food insecurity (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2016). Food insecurity may be recurrent in households, but it is usually not chronic, meaning that most households are food insecure only during certain times in the year (Coleman-Jensen et al., 2016). Currently, 12.7% of all U.S. households are affected by food insecurity, while over a three-year average, 20.8% of Mississippi's households were estimated as food insecure (Coleman-Jensen et al., 2016). Complications of food insecurity include inadequate produce intake, increased risk for development of chronic disease because of low serum nutrient values, and poor physical and psychological health and wellbeing (Bletzacker, Holben, & Holcomb, 2009; Dixon et al., 2001).

The Federally-funded Supplemental Nutrition Assistance Program (SNAP) was designed to “alleviate hunger and improve nutrition by increasing the food purchasing power of low-income households” and is targeted at households with a gross monthly income of 130% of the U.S. poverty line (USDA, 2012, p. 2). The monthly benefit allotment for each household depends on the net monthly income of the household; benefits are given at 30% of that amount, since it is estimated that about 30% of household resources are used on food. These benefits are spent with an Electronic

Benefits Transfer (EBT) card, which can be used at all authorized SNAP retailers. Convenience stores, grocery stores, specialty stores, and farmers' markets are among retailers that accept SNAP. However, not all eligible individuals and households in the United States take advantage of SNAP, nor do all eligible venues, including grocery stores and farmers' markets, accept SNAP benefits. Further studies are needed to assess how best to inform eligible citizens and to improve food access in counties with limited numbers of authorized SNAP retailers.

Farmers' markets are food markets at which local farmers or members of the community sell fruit and vegetables or other agricultural and homemade products directly to consumers or other members of the community (USDA Food and Nutrition Service, 2017). Farmers' markets may help increase fresh fruit and vegetable consumption in communities, which makes it a promising outlet to combat poor diet quality in rural areas that may not have access to fresh foods daily (Holben, 2010). In the latest SNAP retailers annual report, the USDA estimates that of the approximately 260,000 retailers who accepted SNAP in 2014, only 5,175 of those were farmers' markets or farm stands (USDA, 2014). The USDA also estimates that at those retailers, only about \$18.8 million in SNAP benefits are actually being spent; 49% of U.S. counties have at least one SNAP authorized farmers' market (USDA, 2014). One goal of the USDA is to expand the awareness and use of farmers' markets (USDA, 2014).

Farmers' markets have the potential to improve access to fresh produce in communities. McCormack, Laska, Larson, and Story (2010) compiled a literature review on the positive nutritional implications of farmers' markets, including greater intakes of fruits and vegetables and positive produce intake-related behaviors. They suggested that

future, related studies should use “valid, reliable, and widely accepted dietary assessment methods,” particularly in low-income communities, “because of disparities in healthful food access in under-served communities” (McCormack et al., 2010, p. 407). Therefore, farmers’ market programs that provide nutrition education, address health and diet quality, and offer financial resources may be a potential solution for at-risk, rural Mississippi households to improve outcomes.

A farmer’s market nutrition education and monetary incentive intervention (Cultivating Healthy Communities) was developed for and implemented in Calhoun County, Mississippi. The intervention aimed to improve dietary quality and health in participants and decrease factors contributing to household food insecurity. Calhoun County farmers’ markets (Bruce Farmers’ Market, Calhoun Farmers’ Market) do not currently accept WIC vouchers or SNAP benefits/EBT, making payment a potential barrier for participants of WIC or SNAP to shop at these farmers’ markets. Use of monetary incentives is commonplace in farmers’ market studies and may alleviate the perceived cost barriers of farmers’ markets for low-income consumers. (McCormack et al., 2010). Within our intervention, cash incentives, rather than vouchers, were provided to participants to overcome cost barriers, in keeping with current literature, while providing an easy-to-use mode for participating vendors.

This thesis examined: 1) the impact of a farmers’ market nutrition education and monetary incentive intervention on household adult food security status, produce intake, perceived diet quality, and perceived health of individuals living in rural, Appalachian Mississippi; and 2) the relationship of household adult food security status to produce intake, perceived diet quality, and perceived health at baseline. Table 1 summarizes the

research questions and hypotheses.

Table 1

Research Questions and Null Hypotheses of the Study

Research Question	Null Hypothesis
Does household adult food security status improve after participation in a farmers' market education and monetary incentive intervention?	A farmers' market education and monetary incentive intervention will not improve the food security of a household.
Does produce intake increase after participation in a farmers' market education and monetary incentive intervention?	A farmers' market education and monetary incentive program will not increase produce intake at intervention completion.
Does perceived diet quality improve after participation in a farmers' market education and monetary incentive intervention?	A farmers' market education and monetary incentive intervention will not improve participants' perceived diet quality.
Does perceived general health improve after participation in a farmers' market education and monetary incentive intervention?	A farmers' market education and monetary incentive intervention will not improve participants' perceived general health.
What is the relationship of household adult food insecurity status to produce intake, perceived diet quality, and perceived general health before beginning a farmers' market education and monetary incentive intervention?	Household adult food security status will not be significantly correlated with participants' produce intake, perceived diet quality, and perceived health before beginning a farmers' market educational intervention.

II. REVIEW OF LITERATURE

This thesis examined: 1) the impact of a farmers' market nutrition education and monetary incentive intervention on household adult food security status, produce intake, perceived diet quality, and perceived health of individuals living in rural, Appalachian Mississippi; and 2) the relationship of household adult food security status to produce intake, perceived diet quality, and perceived health at baseline.

Definition of Food Security

The USDA defines food security as the “access by all people at all times to enough food for an active and healthy life” (Coleman-Jensen et al., 2016, p. 2). Conversely, food insecurity is defined as a household-level economic and social condition of limited or uncertain access to adequate food; hunger is a potential consequence of food insecurity (USDA 2016). Food security status is a determinant of familial well-being and can be used in research to assess perceived health and diet quality as compared to other households. On a grander scale, the food security status of Americans drives United States policy change and the creation of governmental assistance programs.

Food Security in the United States

Food security is measured annually as a supplemental survey to the Current Population Survey (CPS), which is distributed by the U.S. Census Bureau. The survey consists of 10 to 18 questions that evaluate household spending and how it relates to food consumption over the previous 12 months. Most households evaluated in the general

population survey answer only three of these questions, or five if it is a household with children. In adult households without children, those who are food insecure answer affirmatively to at least one question, and are then further classified into food insecurity subgroups. Overall, according to the 2015 estimates, 12.7% of U.S. households were food insecure sometime during 2015, and 20.8% of Mississippi households were food insecure sometime during 2013-2015 (Coleman-Jensen et al., 2016).

To combat food insecurity, the United States Department of Agriculture offers a Supplemental Nutrition Assistance Program (SNAP) to low-income individuals and families whose gross monthly income is 130% of the poverty line, dependent on the number living in the household. The term “SNAP” was instated by the 2008 Farm Bill, which pledged to commit more money and effort to the food stamp program over the next 10 years and to subtract stigma from the phrase “food stamps” with its rebranding (USDA 2014). Similarly, some food-insecure households qualify for programs such as the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and the National School Lunch Program, though participation is again voluntary. WIC is a federal supplemental program that offers grant assistance to states to offer health care referrals, nutrition education, and supplemental foods to low-income women who are pregnant, breastfeeding, or those with children up to age five who may be at nutritional risk. WIC participants may receive vouchers from the Farmers’ Market Nutrition Program (FMNP). Data is available monthly through the USDA to provide information on participation numbers and cost of these federal programs.

Produce

The term “produce” as it relates to intervention design will refer to fresh fruits and

vegetables. According to the *Dietary Guidelines for Americans 2015-2020*, published together by the U.S. Department of Health and Human Services (HHS) and the USDA, Americans eating a 2,000 calorie diet should consume at least 2-cup equivalents of fruit and 2.5-cup equivalents of vegetables a day. However, Americans' current averages of fruit and vegetable intake fall below the recommended intake ranges (HHS, 2015).

Produce intake at the recommended level, combined with other food group intakes as prescribed through *Dietary Guidelines*, will help reduce chronic disease risk. Populations that do not meet these recommended levels are more likely to have diets that negatively affect their health. Households that are food insecure are likely part of the population not consuming enough of the recommended produce because of expense, distaste for the food, or lack of availability.

Leung et al. (2012) aimed to discover dietary differences between low-income SNAP participants and non-participants using 1999-2008 NHANES data. SNAP participants had poorer diet quality than income-eligible nonparticipants because of a higher consumption of fruit juice, potatoes, and red meat; consequences of poor diet quality such as cardiovascular disease and diabetes may be more prevalent in SNAP participants (Leung et al., 2012). Creative innovations are needed to improve the diet quality of low-income SNAP participants and nonparticipants.

Health

Health is defined as the absence of disease or injury within a person. Perceived health is the degree to which a person believes, using their own measurement, that they are "healthy." Perceived health may be influenced by food security status, particularly in families who are food insecure and feel as though they cannot eat balanced meals. In a

study conducted by Pheley, Holben, Graham, and Simpson (2002), the relationship between food security and self-reported health status in participants of 10 Appalachian Ohio counties was reviewed. The researchers found that all levels of food insecurity, even the least severe, were similarly associated with poor perceived health status (Pheley et al., 2002). This study suggests that families who exhibit even few food insecurity signs may see their insecurity as something that negatively affects their diet. One way for families to assess their health status may be to associate it with their diet quality; nutrition is closely related to health. Food that is inexpensive, easily attainable, or otherwise convenient in terms of pre-cooked or bulk items, often contain low-nutrition, which could be the main cause for developing or poor management of chronic disease in food-insecure adults.

Farmers' Market Programs

Farmers' markets are food markets at which local farmers or members of the community sell their own fruit and vegetables or other homemade products directly to consumers (USDA 2016). Farmers' markets may help increase fresh fruit and vegetable consumption in communities, which makes it a promising outlet to combat poor diet quality in rural areas that may not have access to fresh foods daily. Efforts to expand the awareness and use of farmers' markets in populations enrolled in supplemental help started with the WIC Farmers' Market Nutrition Program (FMNP) established in 1992, which then expanded to the Senior Farmers' Market Nutrition Program (SFMNP). Multiple studies have been conducted to discover the prevalence of SNAP shoppers at farmers' markets, especially when electronic benefit transfer (EBT) machines are available (Byker, Misyak, Shanks, & Serrano 2013; Dannefer et al., 2015; Jilcott Pitts et

al., 2014). Households with more formal education were more likely to participate in the Farmers' Market Nutrition Program (Kropf, 2007).

In a literature review conducted by Byker et al. (2013), evaluated studies looked at how often SNAP benefits were used at a farmer's market when an EBT machine was available. Most of the participants of these interviews were females, not frequent shoppers of the farmer's market, and did not know that EBT cards could be used. A WIC FMNP study in California assessed two intervention groups who were given \$10 weekly to be used at either a supermarket or a farmer's market; these were monitored against a control group. Those at the farmer's market increased fruit and vegetable intake by more servings than the supermarket group, even 6 months out. Multiple studies in this review outlined barriers to using FMNP, including lack of transportation; not having a refrigerator; being busy; expense of farmer's markets.

A study conducted in eastern North Carolina (NC) and northeastern Kentucky (KY) measured four groups of people: those who shopped at farmers' markets, and those who were cold-called to complete surveys in both states. Comparisons were made between the populations of NC and KY, the average BMIs (mostly overweight), ages (middle aged), and fruit and vegetable servings per day. The most heavily cited reasons for not consuming fruits and vegetables included that fresh produce often quickly spoils, the restaurants participants enjoy don't serve fresh fruit, and the high cost of fresh produce. Convenient location, hours of operation, increased number of vendors, and promotional activities are all important enhancements (Jilcott Pitts et al., 2014).

New York City implemented a farmers' market program in 2015 that provided cooking workshops, nutrition education, and cash incentives for participation with extra

bonuses every time shoppers spent \$5 using an EBT card. Participants who attended at least two or three classes had greater fruit and vegetable consumption, had more desire to eat fruits and veggies, noted health-related improvements in managing diet, and learned new ways of preparing produce (Dannefer et al., 2015).

Factors that influence farmers' markets participation include economic, service delivery, spatial, social, and personal reasons, which encompass barriers such as hours of operation, challenges related to market design, and a discriminatory atmosphere for lower-income peoples (Freedman et al., 2016). Participation is low when there is a lack of knowledge that EBT machines are available at markets, potential feelings of disgrace when receiving assistance vouchers (Walker, 2007), and inconsistency in food insecure populations shopping at seasonal farmers' markets for lack of time or transportation. Suggestions like placing markets near established grocery stores to promote a "one-stop" shopping experience, or introducing more subsidy programs to lower the prices of locally grown fruits and vegetables have been proposed as solutions to these obstacles (Freedman et al., 2016).

Food Deserts

A food desert in a rural community is when a market is more than 10 miles from a household. In an urban community, food deserts are measured in walking distance as anything more than half a mile away. Small, medium, and large grocery markets, like mom-and-pop stores and supermarket chains, are included as markets that discredit a community from being a food desert; convenience stores and gas stations are not included in this designation, and have no effect on a community being labelled as a food desert. Food deserts are directly related to food insecurity, as some households do not

always have something to eat because of access-related problems (USDA, 2009). Low-income households in food deserts also do not eat a healthy variety of foods because they shop in convenience stores or markets where the prices are lower than larger stores; this might be a factor in explaining increases in obesity (USDA, 2009). As a result, food deserts negatively affect diet quality because access to fresh fruit and vegetables is limited in convenience stores or gas stations.

Can food deserts be minimized by including availability to farmers' markets in the definition criteria? Farmers' markets could be a viable option to combat poor diet quality among residents in food deserts since farmers' markets serve as access to fresh fruits and vegetables. Research conducted by Sage, McCracken, and Sage (2013) strove to discover whether farmers' markets could help alleviate the negative impacts of food deserts. In the study, both urban and rural areas in Washington state were included to test this theory by using WIC FMNP vouchers (Sage, McCracken, & Sage, 2013). Farmers' markets in food deserts in urban areas saw double the amount of WIC vouchers redeemed than in rural areas (Sage et al., 2013). Urban markets may be more likely to accept vouchers versus rural markets because of the likelihood that these markets are larger and more accustomed to a lower-income population. Urban markets may also have easier access to or the resources to buy equipment like EBT machines, which in turn increases the use of vouchers by those who receive them. However, transportation is most likely the largest barrier for populations in a food desert: urban markets are utilized more by people because of the walkability of these distances, while rural farmers' markets may be even farther away than the nearest supermarket chain by more than 5 to 10 miles.

Food Insecurity Solutions

A solution to food insecurity posed in this study is the use of farmer's markets to encourage a diet rich in fresh, nutritious food, particularly in rural populations where access to such food may be limited. McCormack et al. (2010) compiled a literature review to underscore the potential in farmers' markets for improving health outcomes in low-income populations. Six studies reported on improved produce intake after participation in a farmers' market program, while three found a positive association between vegetable intake and participation. Though not all examined studies described success, benefits to a farmers' market intervention include not only increased produce intake, but increased produce-related behaviors and added community engagement because of the largely social nature of farmers' markets.

III. METHODS

A farmer's market nutrition education and monetary incentive intervention (Cultivating Healthy Communities) was developed for and implemented in Calhoun County, Mississippi, a rural, Appalachian county of Mississippi. This thesis examined: 1) the impact of a farmers' market nutrition education and monetary incentive intervention on household adult food security status, produce intake, perceived diet quality, and perceived health of individuals living in rural, Appalachian Mississippi; and 2) the relationship of household adult food security status to produce intake, perceived diet quality, and perceived health at baseline. Table 1 summarizes the research questions and hypotheses. The study was approved by the University of Mississippi Institutional Review Board prior to data collection.

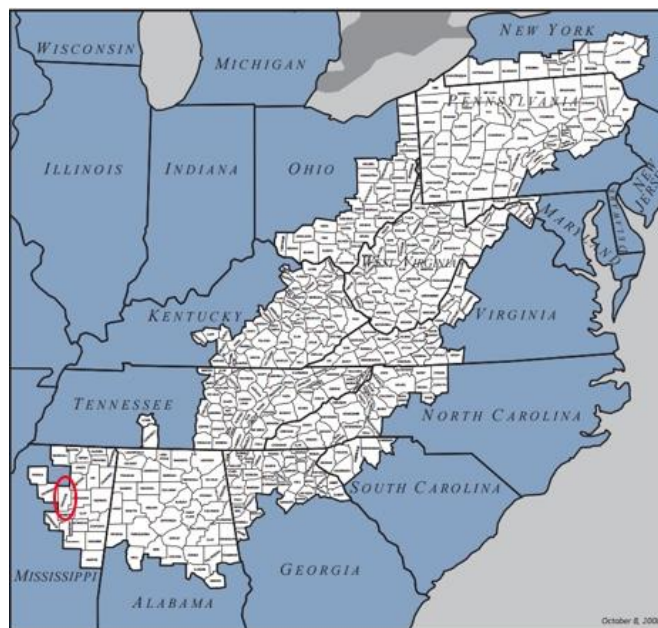
Location

The American Community Survey (ACS), distributed by the U.S. Census Bureau, provides general population characteristics on both the regional and county level in the United States (U.S. Census Bureau, 2016). According to ACS, non-metro counties located in the Southeast, which encompasses Appalachia and the Mississippi Delta, have the highest incidence of poverty (USDA, 2016). Calhoun County is a "non-metro, completely rural county, or with less than 2,500 of its urban population not adjacent to a metro area," according to the Rural-Urban County Codes designation of the USDA's Economic Research Service (USDA, 2016). Calhoun County is also designated as a distressed county for the 2017 fiscal year, according to the Appalachian Regional

Commission (ARC) (2016). Counties are measured for this ARC designation based upon unemployment rates, per capita market income, and poverty rates. As such, distressed counties are those that rank in the lowest 10% of the nation's counties (Appalachian Regional Commission, 2016). Figure A is a map of the Appalachian region, noting the location of Calhoun County, Mississippi.

Figure A

Appalachian Regional Commission Counties Map, 2008



Participants

The intervention was implemented in Calhoun County, Mississippi, at two farmers' markets (Bruce Farmers' Market, Calhoun City Farmers' Market). A convenience sample of 60 adults (19 in Calhoun City; 41 in Bruce) 18 years and older was recruited using signage (Appendix A) at the markets and in the local area, including the Chambers of Commerce. Participants were enrolled at the farmers' markets after reading and signing an informational consent form (Appendix B). Participants had the

right to withdraw at any time during the study.

Procedures

The intervention was 12-weeks during June through August, 2016. After being enrolled and assigned a participant number, participants completed a pre-intervention survey (Appendix D). Assistance was provided to participants with reading or writing, as requested. After completing the survey, a farmers' market cookbook book was provided, as was nutrition education with a food tasting. Three dollars were provided to shop at the market, but participants were not required to spend the funds in any particular fashion. Finally, participants were asked to return to one of the markets each week for the weekly nutrition education, food tasting, and \$3.00 incentive. Three kitchen gadgets to facilitate produce preparation were also provided during the intervention. Appendix C includes the participation sheet utilized for recording participant presence and incentives received over the course of the intervention. At the end of the twelve-week intervention, a post-intervention survey (Appendix E) was completed. Those not attending the market that week were called via telephone to complete the survey. A second follow-up call was provided, in an attempt to maximize participants completing both surveys.

Measures

The pre- and post-intervention surveys measured participant demographics, produce intake (vegetable, fruit, total produce), perceived diet quality, household adult food security status. Demographic questions, including age, gender, race, marital status, education level, employment, current living arrangement, health insurance, religious status, and smoking status, were included. Validated instruments were used in the surveys to measure household adult food security status (Bickel, Nord, Price, Hamilton, & Cook

2000), produce intake and behaviors (Townsend and Kaiser, 2005), and perceived diet quality (Townsend and Kaiser, 2005). A one-item perceived overall health question was also utilized.

Household adult food security status was scored following the USDA scale (Appendix F) (Bickel et al., 2000; USDA 2016). As such, affirmative responses were totaled and categorized in accordance with USDA procedures to determine a food security scale score and category (0 affirmative responses = high food security, 1-2 affirmative responses = marginal food security, 3-5 affirmative responses = low food security, 6-10 affirmative responses = very low food security). Two dichotomous designations were also assigned (0-2 affirmative responses = food secure; 3-10 affirmative responses = food insecure) (0 affirmative responses = fully food secure, 1-10 affirmative responses = not fully food secure).

Produce intake and perceived diet quality questions were from the methods of Townsend and Kaiser (2005). Both perceived diet quality and perceived overall health utilized a Likert scale, with “Excellent” being rated as 5 and “Poor” being rated as 1; frequency of fruit and vegetable intake questions: “Always” = 3 and “Never” = 0.

Table 2 summarizes the variables used in the study, as well as their definition and coding.

Table 2

Variable Definitions and Measurements

Variables	Definition	Coding
Household Adult Food Security Scale Score	Linear scale which measures degree of severity of food insecurity by a household in terms of a numerical value. (USDA)	Numerical value between 0-7.9.

Household Adult Food Security Category		0 = High food security 1-2 = Marginal food security 3-5 = Low food security 6-10 = Very low food security
Household Adult Food Security Status Dichotomous Category (Food Secure versus Food Insecure)	Food secure households had no problems or anxiety or had problems at times, or anxiety about, accessing adequate food, but the quality, variety, and quantity of their food intake were not substantially reduced.	0 = ≤ 3 affirmative responses to U.S. Adult Food Security Survey Module (Food Secure); 1 = ≥ 3 affirmative responses to U.S. Adult Food Security Survey Module (Food Insecure)
Household Adult Food Security Status Dichotomous Category (Fully Food Secure versus Not Fully Food Secure)	Fully food secure households had no problems, or anxiety about, consistently accessing adequate food. (USDA)	0 = no affirmative responses to U.S. Adult Food Security Survey Module (Fully Food Secure) 1 = ≥ 1 affirmative response to U.S. Adult Food Security Survey Module (Not Fully Food Secure)
Daily Servings of Vegetables	Self-identified daily servings of vegetables eaten by participants.	Numerical value in servings
Daily Servings of Fruit	Self-identified daily servings of fruit eaten by participants.	Numerical value in servings
Daily Servings of Total Produce	Sum of Self-identified daily servings of vegetables plus fruit eaten by participants.	Numerical value in servings
Perceived Diet Quality	Self-identified perceived diet quality.	1 = Poor 2 = Fair 3 = Good 4 = Very Good 5 = Excellent
Perceived Health	Self-identified perceived health.	1 = Poor 2 = Fair 3 = Good 4 = Very Good 5 = Excellent

Data Analysis

Statistical analyses were conducted using IBM SPSS 23.0.0.0. All tests were two-tailed with a 95% confidence interval (significance level of $\alpha=.05$). Frequencies were reported on household adult food security status, perceived diet quality, and perceived health at baseline for all participants (n=60), as well as pre- and post-intervention for those completing both pre- and post-intervention surveys (n=39). Means and standard deviations (SD) were reported for household adult food security scale scores, vegetable, fruit, and total produce intakes. Table 3 summarizes the statistical measures utilized to answer each research question.

Table 3

Research Questions and Statistical Measures for the Study

Question	Statistical Measure
Does household adult food security status improve after participation in a farmers' market education and monetary incentive intervention?	t-test
Does produce intake increase after participation in a farmers' market education and monetary incentive intervention?	t-test
Does perceived diet quality improve after participation in a farmers' market education and monetary incentive intervention?	Wilcoxon Signed Rank Test
Does perceived general health improve after participation in a farmers' market education and monetary incentive intervention?	Wilcoxon Signed Rank Test
What is the relationship of household adult food insecurity status to produce intake, perceived diet quality, and perceived general health before beginning a farmers' market education and monetary incentive intervention?	Pearson (produce intake) or Kendall's tau _b (perceived diet quality, perceived health) Correlation

IV. RESULTS

This study examined: 1) the impact of a farmers’ market nutrition education and incentive intervention on household adult food security status, produce intake, perceived diet quality, and perceived health of individuals living in rural, Appalachian Mississippi; and 2) the relationship of household adult food security status to produce intake, perceived diet quality, and perceived health at baseline.

At baseline prior to the intervention (pre-intervention), participants (n=60) were 57 years (*SD*=13 years) old. As shown in Table 4, participants were primarily female (n=51, 85.0%), white (n=51, 85.0%), married (n=36, 60.0%), with some college or higher education (n=40, 66.7%) and non-smokers (n=55, 91.7%). In addition, participants were living in food secure households at baseline (n=47, 78.3%) (Table 5).

Sixty-five percent (n=39) of intervention participants completed both pre- and post-surveys. At baseline prior to the intervention (pre-intervention), the participants completing both surveys were 60 years (*SD*=10 years) old. As shown in Table 4, these participants were primarily female (n=35, 89.7%), white (n=34, 87.2%), married (n=26, 66.7%), with some college or higher education (n=25, 64.1%), and non-smokers (n=34, 87.2%). In addition, the participants completing both pre- and post-surveys were living in food secure households prior to the intervention (n=35, 89.8%) (Table 6).

Table 4

<i>Demographic Characteristics of Participants Prior to the Intervention</i>		
Characteristic	Pre-intervention	Pre-intervention of those

	of all participants (n=60) n (%)	completing both pre- and post- surveys (n=39) n (%)
<u>Gender</u>		
Males	9 (15.0)	4 (10.3)
Females	51 (85.0)	35 (89.7)
<u>Ethnicity</u>		
American Indian or Native American	2 (3.3)	0 (0.0)
Asian	1 (1.7)	1 (2.6)
Black or African American	6 (10.0)	4 (10.3)
White	51 (85.0)	34 (87.2)
<u>Marital Status</u>		
Married	36 (60.0)	26 (66.7)
Widowed	6 (10.0)	5 (12.8)
Divorced	6 (10.0)	2 (5.1)
Separated	1 (1.7)	1 (2.6)
Single/Never Married	11 (18.3)	5 (12.8)
<u>Education</u>		
Less than High School	1 (1.7)	0 (0.0)
High School Graduate - high school diploma or the equivalent (GED)	19 (31.7)	14 (35.9)
Some College or Higher	40 (66.7)	25 (64.1)
<u>Employment Status/Primary Income Source</u>		
Working full-time (35 or more hours per week)	23 (38.3)	14 (35.9)
Working part-time (fewer than 35 hours per week)	8 (13.3)	3 (7.7)
Unemployed	2 (3.3)	2 (5.1)
Social Security Disability	5 (8.3)	4 (10.3)
Applying for Social Security	1 (1.7)	0 (0.0)
Retired	18 (30.0)	15 (38.5)
Other	2 (3.3)	1 (2.6)
Student (part-time or full-time)	1 (1.7)	0 (0.0)
<u>Health Insurance</u>		
No coverage/ self-pay	5 (8.3)	2 (5.1)
Medicaid or Medicare only	16 (26.7)	13 (33.3)
Private insurance only (job/school/purchased)	39 (65.0)	24 (61.5)
<u>Smoking status</u>		
Smoker	5 (8.3)	5 (12.8)
Non-smoker	55 (91.7)	34 (87.2)

Table 5 describes the household adult food security status of all participants at baseline. Table 6 describes the household adult food security status of only participants completing both pre- and post-intervention surveys at baseline and post-intervention.

Table 5

U.S. Household Adult Food Security Status of Participants Prior to the Intervention

Timeframe	Household Adult Food Security Category			
U.S. Household Adult Food Security				
	High Food Security	Marginal Food Security	Low Food Security	Very Low Food Security
	<u>n (%)</u>	<u>n (%)</u>	<u>n (%)</u>	<u>n (%)</u>
Baseline (n=56)	40 (71.4)	7 (12.5)	4 (7.1)	5 (8.9)
U.S. Household Adult Food Security (Food Secure vs. Food Insecure)				
	Food Secure (High, Marginal)		Food Insecure (Low, Very Low)	
	<u>n (%)</u>		<u>n (%)</u>	
Baseline (n=56)	47 (83.9)		9 (16.1)	
U.S. Household Adult Food Security (Fully Food Secure vs. Not Fully Food Secure)				
	Fully Food Secure (High)	Not Fully Food Secure (Marginal, Low, Very Low)		
	<u>n (%)</u>	<u>n (%)</u>		
Baseline (n=56)	40 (71.4)	16 (28.6)		

Table 6

U.S. Household Adult Food Security Status of Participants Completing Both Pre- and Post-Intervention Surveys

Timeframe	Household Adult Food Security Category			
U.S. Household Adult Food Security				
	High Food Security	Marginal Food Security	Low Food Security	Very Low Food Security
	<u>n (%)</u>	<u>n (%)</u>	<u>n (%)</u>	<u>n (%)</u>
Pre (n=39)	32 (82.1)	3 (7.7)	1 (2.6)	3 (7.7)
Post (n=39)	34 (87.2)	2 (5.1)	1 (2.6)	2 (5.1)
U.S. Household Adult Food Security (Food Secure vs. Food Insecure)				
	Food Secure (High, Marginal)		Food Insecure (Low, Very Low)	
	<u>n (%)</u>		<u>n (%)</u>	
Pre (n=39)	35 (89.7)		4 (10.3)	
Post (n=39)	36 (92.3)		3 (7.7)	

U.S. Household Adult Food Security (Fully Food Secure vs. Not Fully Food Secure)		
	Fully Food Secure (High)	Not Fully Food Secure (Marginal, Low, Very Low)
	<u>n (%)</u>	<u>n (%)</u>
Pre (n=39)	32 (82.1)	7 (17.9)
Post (n=39)	34 (87.2)	5 (12.8)

Adult household food security status (scale score) did not significantly change during the study [pre, MEAN=0.590 (*SD*=1.545); post, MEAN=0.492 (*SD*=1.470)] (*p*=.344). Appendix B includes the rubric utilized for scoring the adult household food security measure, including scale score values.

Daily vegetable, fruit, and total produce intakes are summarized in Table 7 for all participants at baseline.

Table 7

Produce Intake (in servings) of Participants Prior to the Intervention (n=60)

	Mean	SD
Total Produce Intake	3.81	1.40
Daily Vegetable Intake	2.26	0.89
Daily Fruit Intake	1.55	0.86

Table 8 summarizes produce intake of participants completing the intervention.

Table 8

Produce Intake (in servings) of Participants Completing Both Pre- and Post-Intervention Surveys (n=39)

Timeframe	Mean	SD	<i>p</i> -value ^a
<u>Total Produce Intake</u>			
Pre-intervention	3.85	1.37	.071
Post-intervention	4.17	1.54	
<u>Daily Vegetable Intake</u>			
Pre-intervention	2.28	0.89	.242
Post-intervention	2.45	0.97	
<u>Daily Fruit Intake</u>			
Pre-intervention	1.56	0.85	.244
Post-intervention	1.72	0.92	

^a Paired t-test

Tables 9 and 10 describe participants' perceived diet quality and perceived general health.

Table 9

Perceived Diet Quality and General Health of Participants Prior to the Intervention

Timeframe	Category				
Perceived Diet Quality					
	Excellent <u>n (%)</u>	Very Good <u>n (%)</u>	Good <u>n (%)</u>	Fair <u>n (%)</u>	Poor <u>n (%)</u>
Baseline (n=60)	0 (0.0)	11 (18.3)	34 (56.7)	14 (23.3)	1 (1.7)
Perceived General Health					
	Excellent <u>n (%)</u>	Very Good <u>n (%)</u>	Good <u>n (%)</u>	Fair <u>n (%)</u>	Poor <u>n (%)</u>
Baseline (n=60)	12 (20.0)	18 (30.0)	23 (38.3)	6 (10.0)	1 (1.7)

Table 10

Perceived Diet Quality and General Health of Participants Completing Both Pre- and Post-Intervention Surveys

Timeframe	Category				
Perceived Diet Quality					
	Excellent <u>n (%)</u>	Very Good <u>n (%)</u>	Good <u>n (%)</u>	Fair <u>n (%)</u>	Poor <u>n (%)</u>
Pre-Intervention (n=39)	2 (5.1)	14 (35.9)	16 (41.0)	6 (15.4)	1 (2.6)
Post-Intervention (n=39)	0 (0.0)	9 (23.1)	23 (59.0)	7 (17.9)	0 (0.0)
Perceived General Health					
	Excellent <u>n (%)</u>	Very Good <u>n (%)</u>	Good <u>n (%)</u>	Fair <u>n (%)</u>	Poor <u>n (%)</u>
Pre-Intervention (n=39)	4 (10.3)	19 (48.7)	14 (35.9)	2 (5.1)	0 (0.0)
Post-Intervention (n=39)	6 (15.4)	14 (35.9)	15 (38.5)	3 (7.7)	1 (2.6)

Perceived diet quality did not significantly change between pre- and post-intervention (Related Samples Wilcoxon Signed Rank Test, p=.135). Perceived general

health did not significantly change between pre- and post-intervention (Related Samples Wilcoxon Signed Rank Test, $p=.285$).

Table 11 summarizes the relationship of household adult food insecurity status (scale score) to produce intake, perceived diet quality, and perceived general health before beginning a farmers' market education and monetary incentive intervention. Household adult food insecurity was significantly related only to perceived diet quality at baseline ($\tau_{b}=-0.250$, $p=.039$).

Table 11

Relationship of Food Insecurity to Produce and Health-Related Factors in Participants Prior to the Intervention

Factor	Correlation Coefficient	p-value
Total Produce Intake	-0.071 ^a	.602
Daily Vegetable Intake	-0.035 ^a	.796
Daily Fruit Intake	-0.163 ^a	.229
Perceived Diet	-0.250 ^b	.039
Perceived Health	-0.214 ^b	.068

^a Pearson r Correlation Coefficient

^b Kendall's tau_b Coefficient

V. CONCLUSIONS

This thesis examined: 1) the impact of a farmers' market nutrition education and monetary incentive intervention on household adult food security status, produce intake, perceived diet quality, and perceived health of individuals living in rural, Appalachian Mississippi; and 2) the relationship of household adult food security status to produce intake, perceived diet quality, and perceived health at baseline:

1. Does household adult food security status improve after participation in a farmers' market education and monetary incentive intervention?
2. Does produce intake increase after participation in a farmers' market education and monetary incentive intervention?
3. Does perceived diet quality improve after participation in a farmers' market education and monetary incentive intervention?
4. Does perceived general health improve in a farmers' market education and monetary incentive intervention?
5. What is the relationship of household adult food insecurity status to produce intake, perceived diet quality, and perceived general health before beginning a farmers' market education and monetary incentive intervention?

Overall, the study showed that participants of a farmers' market nutrition education and monetary incentive intervention did not significantly improve household adult food security status, produce intake, perceived diet quality, or perceived general health. In addition, household adult food insecurity was related to perceived diet quality at baseline.

Household Adult Food Security

The intervention did not significantly change household adult food security status among participants. This was not unexpected, as the intervention only had the potential to increase household monetary resources by \$36. While our study did not include only individuals with low-incomes, one rationale for the findings is that our participants may rather rely on resources like a food pantry or food bank. Dimitri, Oberholtzer, Zive, & Sandolo (2015) examined five farmers' markets located in New York City, Boston, and San Diego to assess if weekly monetary incentives had the ability to improve food insecurity in low-income populations; this study was unique in that weekly monetary incentives incrementally increased as the study period went on. Overall, more than half of the study participants consumed vegetables more frequently by intervention completion, and participants who did not report increased vegetable intake were not in proximity to the market and were more likely to rely on food banks or food pantries (Dimitri et al., 2015).

Golan, Steward, Kuchler, and Dong (2008) reviewed the cost of a healthy diet in America and how SNAP benefits affect household spending. They noted that an additional dollar of income in a food-insecure household would only result in an increase of 5 to 10 cents in grocery purchases, suggesting that these households focus their spending on other basic needs (Golan et al., 2008). Since monetary incentives were given out in cash during our intervention, food insecure households potentially could have used the money for other basic needs, as Golan and colleagues suggested, or other wants. Therefore, household adult food security status of these participants may not have been affected by the monetary incentives provided.

As will be discussed in the next section, the nutrition education portion of the intervention did not provide in-depth education on financial management for households, with the intent to improve household adult food security, rather it focused on improving produce intake. Effective financial management education programs, such as the Plan, Shop, Save, and Cook class series from the University of California, Davis, have shown that participants are more likely to greatly use resource management skills when grocery shopping (Kaiser et al., 2015). These resource management skills increase the likelihood that a family will be able to make food last between paychecks (Kaiser et al., 2015).

It is worth noting, as previously summarized in the results section, 16.1% of our sample was living in food insecure households. This is greater than U.S. households, yet less than Mississippi households. According to the 2015 estimates, 12.7% of U.S. households were food insecure sometime during 2015, and 20.8% of Mississippi households were food insecure sometime during 2013-2015 (Coleman-Jensen et al., 2016).

Produce Intake

The intervention did not significantly change vegetable, fruit, or total produce intakes among participants. When barriers exist, individuals cannot effectively change behavior (Kreuter et al., 2000). The intervention was developed using the principles of social-cognitive theory. Social-cognitive theory emphasizes reciprocal determinism, that is, environmental factors influence individuals and groups, who can also influence environments and regulate their own behavior (Glanz et al., 2008). Concepts of social-cognitive theory include *facilitation* (providing tools, resources, or environmental changes that make new behaviors easier to perform), *self-efficacy* (beliefs about personal

ability to perform behaviors that bring desired outcomes), and *observational learning* (learning to perform new behaviors by exposure to them, particularly through peer modeling) (Glanz et al., 2008).

The intervention for this study not only included a weekly monetary incentive for purchasing produce at the farmers' market, but it also included produce-related nutrition messages, nutrition education, and seasonal recipe sheets, all intending to encourage the consumption of seasonal fruits and vegetables. A farmers' market cookbook produced in Mississippi was also provided at the onset of the study. Kitchen gadgets to facilitate use of produce, including a vegetable spiralizer, vegetable steamer, and cutting board, were given periodically throughout the study. Weekly produce-centered recipe tasting and demonstrations exhibited how to prepare locally-sourced vegetables and fruit using the gadgets provided.

Provision of a monetary incentive to purchase locally-grown, fresh produce relates to the social-cognitive theory concept of *facilitation* and was intended to promote a change in the household environment in order to make produce intake easier by participants, while bolstering sales at the farmers' markets. The intervention also intended to promote *self-efficacy* by improving participants' ability to consume produce.

During the farmers' markets, research team members acted as "mentors" or "peer models" to participants, providing nutrition education (e.g., seasonal availability of produce cards, recipes with cooking demonstrations) and tools (e.g., kitchen gadgets) to ease selection and preparation of produce for the household. The nutrition education provided relates to the social-cognitive theory concepts of *facilitation*, *self-efficacy*, and *observational learning*. It was intended to provide tools and resources to foster improved

access to and consumption of produce. Finally, the intervention related to *incentive motivation* through provision of rewards (e.g., weekly monetary incentive, periodic provision of kitchen gadgets) and was intended to facilitate the desired outcomes (e.g., increase produce intake).

While the intervention did not facilitate improved vegetable, fruit, or total produce intakes, study participants might not have been ready to change. The stages of change theory, as described by DiClemente and Prochaska (1983), specifies that each of our participants would have been at different stages of readiness to change their produce intake habits. A 12-week intervention may have been too short for some participants to be actively working toward changing their behavior. To alleviate this problem, in future studies, nutrition messages could be tailored to each participant, based upon their stage of readiness.

However, Dannefer et al. (2015) conducted a study to determine how nutrition education affects fruit and vegetable consumption in SNAP participants. Positive outcomes, such as increased fruit and vegetable consumption, positive attitudes toward increased fresh produce intake, and knowledge to prepare fruits and vegetables, increased with greater class attendance, suggesting that more frequent exposure to nutrition education removes barriers to fruit and vegetable consumption (Dannefer et al., 2015). Our intervention included 12 opportunities for nutrition education with handouts and food tastings/demonstrations. One limitation to this education is that participants who do not often cook their own meals may not have been confident preparing recipes on their own. Considering that participants who completed our intervention did not necessarily attend the farmers' market every week, our nutrition education curriculum might not have

facilitated change, due to infrequent exposure.

Diet Quality

The intervention did not significantly change perceived diet quality among participants. A high diet quality can be described as one rich in essential vitamins, minerals, and trace elements through balanced and varied nutrition. In 2013, adults in the United States were estimated to eat fruit 1.1 times a day and vegetables 1.6 times a day, while *Dietary Guidelines for Americans* suggests at least 2 cups of fruit and 2.5 cups of vegetables daily (CDC, 2013; DHHS, 2015). Consumption to fresh produce is influenced by cultural background and cost (Casagrande et al., 2007). These are potential barriers contributing to Americans eating a varied diet rich in fruits and vegetables (Casagrande et al. 2007), and they may also have contributed to our findings.

Dimitri et al. (2015) suggests that weekly monetary incentives will facilitate improved vegetable intake at farmers' markets, especially when participants live within proximity of the market, suggesting that geographic access plays a role in the diet quality, especially of those living in of food insecure households. Both Calhoun City, MS, and Bruce, MS, have at least one grocery store and, out of habit, citizens may not have considered frequenting the summer farmers' markets to buy groceries, even after enrolling into the study. Incrementally increasing our monetary incentives each week may have better incentivized our participants to shop at the farmers' markets.

Perceived Health

The intervention did not significantly change perceived overall health among participants. As previously noted, the focus of our intervention was on improving produce intakes and behaviors. Poor health status is closely related to malnutrition, which

may stem from chronic food insecurity (Nelson, Cunningham, Andersen, Harrison, & Gelberg, 2001). While adequate produce intake is essential for achieving optimal health and reducing chronic disease risk (DHHS, 2015), the nutrition education associated with the intervention may not have fully underscored this important message. Measuring changes in the perceived benefits of produce by participants in future studies may be beneficial.

Relationship of Household Adult Food Security Status to Other Variables

As previously noted, 16.1% of our sample was living in food insecure households, which is less than the 2013-15 estimates for Mississippi households during 2013-2015 (Coleman-Jensen et al., 2016). Overall, household adult food security status was significantly related to perceived diet quality, but not vegetable, fruit, and total produce intakes or perceived overall health among participants. Household adult food insecurity was associated with poorer perceived diet quality at baseline. A representative sample of U.S. adults participating in NHANES showed that food-insufficient households report significantly lower intakes of fruits and vegetables than food-sufficient households (Dixon et al., 2001). In fact, these food-insufficient households lacked essential vitamins and minerals that may increase their likelihood for chronic disease development (Dixon et al., 2001).

In a study of women living in a distressed, Appalachian county of Ohio and participating in the WIC, Kropf (2007) found that food insecurity was negatively associated with perceived diet quality. Although, when considering those participating in WIC Farmers' Market Nutrition Program (FMNP) and those not participating, participants of WIC FMNP had a better perceived diet quality.

No significant correlations were found between household adult food insecurity and produce intakes or perceived overall health at baseline. Holben (2010) summarized that food insecurity is associated with poorer physical and mental. In fact, individuals living in food insecure households may consume diets that increase risk for health disparities, including chronic diseases (Holben, 2010).

Limitations

Several limitations existed that could have impacted the study. First, only 65% of participants completed both pre- and post-intervention surveys. Those completing both surveys, however, did not attend all 12 weeks of the intervention. Some participants had only attended the farmers' markets within the first month. As such, if participants did not receive the weekly nutrition education, monetary incentives, and kitchen tools, it is unlikely that behavior change would have been facilitated.

Second, those participating in the intervention to a greater degree was non-random, meaning they self-selected to participate and may have had particular characteristics. As previously noted, participants at baseline were primarily female, white, married, and working full-time. Participants who completed both surveys were primarily female, white, married, and retired. Market hours might have been a barrier for participants who worked full-time. For others still, including those living in a food insecure household, perceived higher cost of fresh produce and the inability to use SNAP benefits may have hindered participation. This might be particularly true in Calhoun County markets, where SNAP benefits are not accepted. Consequently, those who attended the Calhoun County farmers' markets were more likely to be food secure. While not measured, another barrier to participation may have been lacking of transportation to

the market.

Resource management skills were not included as part of the intervention's nutrition education curriculum. Adding this to future research studies is warranted.

The summer farmers' markets in Calhoun City, MS, and Bruce, MS, did not draw the same market vendors consistently each week. In fact, at the Calhoun City market, no vendors were present some weeks, resulting in the likelihood that participants would not attend the market that or subsequent weeks. This may have precipitated falling out of the habit of attending the market, resulting in a loss of weekly benefits.

Discrepancies may reside in participant responses to each survey. Responses related household adult food security, produce intakes, perceived diet quality, and perceived overall health may be over- or under-estimated because of individual perception and bias. In addition, participants might not have reported produce intake accurately, because no examples or standards of serving sizes were given on the surveys. However, validated measures were used when available (USDA 2016; Townsend & Kaiser, 2005).

One error regarding race was included in the surveys and noted as "Asian Native," rather than "Asian." The term "Asian" is the race category described and utilized by the U.S. Census Bureau (U.S. Census Bureau, 2010). Our sample only included one individual identifying as Asian, so this typographical error probably did not skew our findings.

The curriculum included in this study's design could easily serve as the basis for future interventions. Future research should examine the impact of the intervention utilizing a control group. Assessment of the intervention in different, more diverse

communities may also be beneficial. Additional attempts at incentivizing participants throughout the intervention may encourage participants to stay involved from week to week. Continuing to explore the efficacy of rural farmers' markets to improve food security status and other outcomes, including those related to diet and health, is vital. As previously reviewed, farmers' markets may indeed be fertile ground for improving nutrition outcomes in the United States (Holben, 2010).

REFERENCES

- Appalachian Regional Commission. (2017). County economic status and distressed areas in Appalachia. Retrieved from:
https://www.arc.gov/appalachian_region/CountyEconomicStatusandDistressedAreasinAppalachia.asp
- Bickel, G., Nord, M., Price, C., Hamilton, W., & Cook, J. (2000). *Guide to measuring household food security*. (). Alexandria, VA: United States Department of Agriculture.
- Bletzacker, K. M., Holben, D. H., & Holcomb, J. P. (2009). Poverty and proximity to food assistance programs are inversely related to community food security in an Appalachian Ohio region. *Journal of Hunger & Environmental Nutrition*, 4(2), 172-184. doi:10.1080/19320240902915276
- Buttenheim, A. M., Havassy, J., Fang, M., Glyn, J., & Karpyn, A. E. (2012). Increasing supplemental nutrition assistance program/electronic benefits transfer sales at farmers' markets with vendor-operated wireless point-of-sale terminals. *Journal of the Academy of Nutrition and Dietetics*, 112(5), 636-641.
doi://doi.org.umiss.idm.oclc.org/10.1016/j.jand.2011.12.021
- Byker, C. J., Misyak, S., Shanks, J., & Serrano, E. L. (2013). Do farmers' markets improve diet of participants using federal nutrition assistance programs? A literature review. *Journal of Extension*, 51(6)
- Casagrande, S. S., Wang, Y., Anderson, C., & Gary, T. L. (2007). Have Americans

increased their fruit and vegetable intake? The trends between 1988 and 2002. *American Journal of Preventive Medicine*, 32(4), 257-263.

doi:10.1016/j.amepre.2006.12.002

Centers for Disease Control and Prevention. State Indicator Report on Fruits and Vegetables, 2013. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Department of Health and Human Services; 2013.

Christaldi, J., & Cuy Castellanos, D. (2014). Identifying factors, barriers, and solutions related to food insecurity in lackawanna county, pennsylvania. *Journal of Hunger & Environmental Nutrition*, 9(2), 182; 182.

Cuy Castellanos, D., Christaldi, J., & Borer, K. (2014). Using the diffusion of innovations to develop healthy cooking demonstrations at a farmers' market. *Journal of Hunger & Environmental Nutrition*, 9(4), 471-484.

doi:10.1080/19320248.2014.908448

Dannefer, R., Abrami, A., Rapoport, R., Sriphanlop, P., Sacks, R., & Johns, M. (2015). mixed-methods evaluation of a SNAP-ed farmers' market-based nutrition education program. *Journal of Nutrition Education and Behavior*, 47(6), 516-525.

doi:10.1016/j.jneb.2015.08.021

Dimitri, C., Oberholtzer, L., Zive, M., & Sandolo, C. (2015). Enhancing food security of low-income consumers: An investigation of financial incentives for use at farmers markets. *Food Policy*, 52, 64-70. doi:10.1016/j.foodpol.2014.06.002

Dixon, L. B., Winkleby, M. A., & Radimer, K. L. (2001). Dietary intakes and serum nutrients differ between adults from food-insufficient and food-sufficient families: Third national health and nutrition examination survey, 1988-1994. *Journal of*

Nutrition, 131(4), 1232-1246.

- Freedman, D. A., Vaudrin, N., Schneider, C., Trapl, E., Ohri-Vachaspati, P., Taggart, M., Flocke, S. (2016). Systematic review of factors influencing farmers' market use overall and among low-income populations. *Journal of the Academy of Nutrition and Dietetics*, 116(7), 1136-1155. doi:10.1016/j.jand.2016.02.010
- Glanz, K., & Bishop, D. B. (2010). The role of behavioral science theory in development and implementation of public health interventions. *Annual Review of Public Health*, 31, 399-418. doi:10.1146/annurev.publhealth.012809.103604
- Golan, E., Stewart, H., Kuchler, F., & Dong, D. (2008). Can Low-Income Americans Afford a Healthy Diet?. *Amber Waves: The Economics Of Food, Farming, Natural Resources, & Rural America*, 6(5), 26-33.
- Gucciardi, E., Vahabi, M., Norris, N., Del Monte, J., & Farnum, C. (2014). The intersection between food insecurity and diabetes: A review. *Current Nutrition Reports*, 3(4), 324-332. doi:10.1007/s13668-014-0104-4
- Holben, D. H. (2010). Farmers' markets: Fertile ground for optimizing health. *J Am Diet Assoc*, 110(3), 364-365. doi:10.1016/j.jada.2009.11.015
- Holben, D. H. (2010). Position of the American Dietetic Association: Food insecurity in the united states. *Journal of the American Dietetic Association*, 110(9), 1368-1377. doi://doi-org.umiss.idm.oclc.org/10.1016/j.jada.2010.07.015
- Jilcott Pitts, S. B., Gustafson, A., Wu, Q., Leah Mayo, M., Ward, R. K., McGuirt, J. T., Ammerman, A. S. (2014). Farmers' market use is associated with fruit and vegetable consumption in diverse southern rural communities. *Nutrition Journal*, 13(1), 1. doi:10.1186/1475-2891-13-1

- Jilcott Pitts, S. B., Hinkley, J., Wu, Q., McGuirt, J. T., Lyonais, M. J., Rafferty, A. P., Phillips, L. (2017). A possible dose-response association between distance to farmers' markets and roadside produce stands, frequency of shopping, fruit and vegetable consumption, and body mass index among customers in the southern United States. *BMC Public Health*, 17(1) doi:10.1186/s12889-016-3943-7
- Kaiser, L., Chaidez, V., Algert, S., Horowitz, M., Martin, A., Mendoza, C., Neelon, M., Ginsburg, D. (2015). Food resource management education with snap participation improves food security. *J Nutr Educ Behav*. 47:374-378.
- Kirkpatrick, S. I. (2012). Understanding and addressing barriers to healthy eating among low-income americans. *Journal of the Academy of Nutrition and Dietetics*, 112(5), 617-620.
doi://doi.org.umiss.idm.oclc.org/10.1016/j.jand.2012.02.009
- Kolodinsky, J., Berlin, L., Nelson, A., & Norris, K. (8). The role of social cognitive theory in farm-to-school-related activities: Implications for child nutrition. *The Journal of School Health*, 83(8), 589; 589.
- Kropf, M. L. (2007). Food security status and produce intake and behaviors of special supplemental nutrition program for women, infants, and children and farmers' market nutrition program participants. *J Am Diet Assoc*, 107(11), 1903-1908.
doi:10.1016/j.jada.2007.08.014
- McCormack, L. A., Laska, M.N., Larson, N.I., Story, M. (2010). Review of the nutritional implications of farmers' markets and community gardens: A call for evaluation and research efforts. *J Am Diet Assoc*, 110(3), 399-408.
doi:10.1016/j.jada.2009.11.023

- Nelson, K., Cunningham, W., Andersen, R., Harrison, G., & Gelberg, L. (2001). Is food insufficiency associated with health status and health care utilization among adults with diabetes? *Journal of General Internal Medicine*, *16*(6), 404–411. <http://doi.org/10.1046/j.1525-1497.2001.016006404.x>
- Pheley, A. M., Holben, D. H., Graham, A. S., & Simpson, C. (2002). Food security and perceptions of health status: A preliminary study in rural Appalachia. *The Journal of Rural Health*, *18*(3), 447–453. doi:10.1111/j.1748-0361.2002.tb00909.x
- Sage, J. L., McCracken, V. A., & Sage, R. A. (2013). Bridging the gap: Do farmers' markets help alleviate impacts of food deserts? *American Journal of Agricultural Economics*, *95*(5), 1273–1279. doi:10.1093/ajae/aat031
- Seligman, H. K., Laraia, B. A., & Kushel, M. B. (2010a). Food insecurity is associated with chronic disease among low-income NHANES participants. *Journal of Nutrition*, *140*(2), 304–310. doi:10.3945/jn.109.112573
- Stuff, J. E., Casey, P. H., Szeto, K. L., Gossett, J. M., Robbins, J. M., Simpson, P. M., . . . Boglet, M. L. (2004). Household food insecurity is associated with adult health status. *Journal of Nutrition*, *134*(9), 2330–2335.
- Townsend, M. S., & Kaiser, L. L. (2005). Development of a tool to assess psychosocial indicators of fruit and vegetable intake for 2 federal programs. *Journal of Nutrition Education and Behavior*, *37*(4);170-184. doi://dx.doi.org.umiss.idm.oclc.org/10.1016/S1499-4046(06)60243-1
- U.S. Census Bureau (2010). *Overview of Race and Hispanic Origin*. Retrieved from <https://www.census.gov/prod/cen2010/briefs/c2010br-02.pdf>.
- United States Department of Agriculture. Agricultural Marketing Service. (2016).

Farmers markets and direct-to-consumer marketing. Retrieved from <https://www.ams.usda.gov/services/local-regional/farmers-markets-and-direct-consumer-marketing>

United States. Department of Agriculture. Economic Research Service. (2009). *Access to affordable and nutritious food: Measuring and understanding food deserts and their consequences : Report to congress*. Alexandria, V.A.: U.S. Dept. of Agriculture, Economic Research Service

United States. Department of Agriculture. Food and Nutrition Service. (2014). *SNAP retailer management 2014 annual report*. Alexandria, V.A..

United States Department of Agriculture., Food and Nutrition Service., & Office of Research and Analysis. (2012). *Building a healthy America: A profile of the Supplemental Nutrition Assistance Program*. Retrieved from <https://fnsprod.azureedge.net/sites/default/files/BuildingHealthyAmerica.pdf>

United States Department of Health and Human Services and U.S. Department of Agriculture. *2015 – 2020 Dietary Guidelines for Americans*. 8th Edition. December 2015. Available at <http://health.gov/dietaryguidelines/2015/guidelines/>.

Walker, J. L. (2007). Household food insecurity is inversely associated with social capital and health in females from Special Supplemental Nutrition Program for Women, Infants, and Children households in appalachian ohio. *J Am Diet Assoc*, *107*(11), 1989-1993. doi:10.1016/j.jada.2007.08.004

Wasserman, Wendy, Debra Tropp, Velma Lakins, Carolyn Foley, Marga DeNinno, Jezra Thompson, Nora Owens, and Kelly Williams. *Supplemental Nutrition Assistance Program (SNAP) at Farmers Markets: A How-To Handbook*.

U.S. Department of Agriculture, Agricultural Marketing Service, June
2010. <<http://dx.doi.org/10.9752/MS039.06-2010>>

Wycherley, T. P., Brinkworth, G. D., Clifton, P. M., & Noakes, M. (2012). Comparison of the effects of 52 weeks weight loss with either a high-protein or high-carbohydrate diet on body composition and cardiometabolic risk factors in overweight and obese males. *Nutrition and Diabetes*, 2(AUGUST), e40. doi:10.1038/nutd.2012.11

APPENDICES

CHC RECRUITMENT SHEET

Title: Cultivating Healthy Communities: Using Farmers' Markets as an Avenue for Education to Improve Health while Fostering Community Economic Development

Investigators

David H. Holben, PhD, RDN, LD, FAND
Jonathan Jamieson, Student
Heather Poole, Student
Department of Nutrition and Hospitality
Management
108 Lenoir Hall
The University of Mississippi
(662) 915-1359



INTERESTED IN A FREE COOKBOOK, MONEY TO BUY PRODUCE AT THE FARMERS' MARKET, AND FREE KITCHEN GADGETS????

WE ARE CONDUCTING A RESEARCH STUDY.

To participate, you must be 18 years of age or older.

The research study will include:

- **Completing a survey in June and in August.**
- **Receiving incentives during the study, like a cookbook and kitchen gadgets, plus \$3 to buy produce every week that you come to the market!**

ASK FOR AN INFORMATION SHEET ABOUT THE STUDY AT THE COOKING DEMONSTRATION BOOTH TO LEARN MORE!

IRB Approval

This study has been reviewed by The University of Mississippi's Institutional Review Board (IRB). If you have any questions, concerns, or reports regarding your rights as a participant of research, please contact the IRB at (662) 915-7482 or irb@olemiss.edu.

Appendix B

CHC INFORMATION SHEET

Title: Cultivating Healthy Communities: Using Farmers' Markets as an Avenue for Education to Improve Health while Fostering Community Economic Development

Investigators

David H. Holben, PhD, RDN, LD, FAND
Jonathan Jamieson, Student
Heather Poole, Student
Department of Nutrition and Hospitality
Management
108 Lenoir Hall
The University of Mississippi
(662) 915-1359

INCLUDE THE FOLLOWING ONLY IF YOU ARE COLLECTING DATA

EXCLUSIVELY FROM ADULTS By checking this box I certify that I am 18 years of age or older.

Description

The purpose of this research project is to determine the effect of food and nutrition education and produce vouchers at farmers' markets in Calhoun County, Mississippi, on both consumers and farmers. Consumers will complete a survey when enrolled into the study and later in the summer. Farmers may enroll into the consumer portion of the study, if desired. Farmers will only a satisfaction survey at the end of the study, unless enrolled in both portions of the study. Your name or any other identifying information will not be on the survey, but you will have a subject number so that we can link your pre- and post-study information. Only one household member may enroll into the study.

Cost and Payments

Consumers: After completing the pre-survey that is approximately 10-minutes in length when you enroll into the study sometime in June, you will receive a cookbook. You will also receive \$3.00 to spend at the farmers' market for produce. Until August 17 or 18, 2016, each week that you return to the farmers' market and check in at our booth, you will receive an additional \$3.00 to spend at the farmers' market for produce. Twice during the summer, you will also receive a kitchen gadget to help with produce storage or preparation. After completing the post-survey at the end of the program (August 17 or 18, 2016), you will receive a kitchen gadget.

Farmers: No compensation will be provided to farmers who complete only the farmer satisfaction survey. Farmers enrolled as consumers will receive the consumer benefits summarized above.

Risks and Benefits

You may feel uncomfortable with some of the questions asked about the food situation in your household. For example, some questions ask if you worry about having enough money to buy food. We do not think that there are any other risks. A lot of people enjoy taking questionnaires. Information from the study may help to develop programs that benefit people in Mississippi and other areas of the country.

Confidentiality

Consumers will complete an information sheet at the beginning of the study so that we can assign you a subject number and keep track of when you receive your cookbook, farmers' market money, and kitchen gadgets. The information sheet with your subject number will be stored in a locked cabinet. Consumer surveys will only include your subject number so that no one will be able to identify you.

Farmers not in the consumer portion of the study will only complete the post survey. No identifiable information will be recorded, therefore we do not think you can be identified from this study.

Right to Withdraw

You do not have to take part in this study as a consumer and/or farmer, and you may stop participation at any time. If you start the study and decide that you do not want to finish, all you have to do is to tell Dr. Holben, Mr. Jamieson, or Ms. Poole in person, by letter, or by telephone (contact information listed above). You may skip any questions you prefer not to answer.

IRB Approval

This study has been reviewed by The University of Mississippi's Institutional Review Board (IRB). If you have any questions, concerns, or reports regarding your rights as a participant of research, please contact the IRB at (662) 915-7482 or irb@olemiss.edu.

Statement of Consent

I have read and understand the above information. By completing the survey, I consent to participate in the study.

Appendix C

CHC INCENTIVE SHEET

Title: Cultivating Healthy Communities: Using Farmers' Markets as an Avenue for Education to Improve Health while Fostering Community Economic Development

Investigators

David H. Holben, PhD, RDN, LD, FAND
Jonathan Jamieson, Student
Heather Poole, Student

SUBJECT NUMBER: _____

DATE OF ENROLLMENT: _____

Name: _____

Address: _____

Phone: _____

Date	Incentive(s) Received		Signature
June 1/2, 2016	\$3.00	Cookbook	
June 8/9, 2016	\$3.00		
June 15/16, 2016	\$3.00		
June 22/23, 2016	\$3.00	Kitchen Gadget 1	
June 29/30, 2016	\$3.00		
July 6/7, 2016	\$3.00		
July 13/14, 2016	\$3.00		
July 20/21, 2016	\$3.00	Kitchen Gadget 2	
July 27/28, 2016	\$3.00		
August 3/4, 2016	\$3.00		
August 10/11, 2016	\$3.00		
August 17/18, 2016	\$3.00	Kitchen Gadget 3	

Appendix D

Cultivating Healthy Communities: Using Farmers' Markets as an Avenue for Education to Improve Health while Fostering Community Economic Development Pre-Survey

Completion of this survey is completely voluntary and may cease at any time. No one will be able to identify you in any report resulting from this survey.

Tell Us About You.

How old are you? _____

What is your race? (Circle all that apply)					
American Indian or Native Alaskan	Asian Native	Black or African American	Hispanic	Hawaiian or Other Pacific Islander	White
Other (Please specify.)					

What is your current marital status? (Circle one answer)				
Married	Widowed	Divorced	Separated	Single/Never Married
If not married, do you have a live-in partner? Yes No				

Including you, how many people live in your household?	_____ adults
	_____ children 18 yrs & younger

What is your highest level of education completed?	
(Check one box only)	
Less than High School	
High School Graduate – high school DIPLOMA or the equivalent (GED)	
Some College or Higher	

What is your occupation type?	
(Check one box only)	
Working full-time (35 or more hours per week)	
Working part-time (fewer than 35 hours per week)	
Unemployed	
Student (either full or part-time)	
Social Security Disability	
Applying for Social Security	
Retired	
Other (Please explain)	

Which of the following best describes your current living arrangement?	
(Check one box only)	
I live with immediate family members (parents, brothers, sisters)	
I live with my partner/significant other/spouse	
I live with relatives (cousins, aunt or uncle, etc.)	
I live with a friend (or friends)	
I live alone	

Do you currently have health insurance? (Circle one answer)		
No coverage/ self-pay	Medicaid or Medicare only	Private insurance only (job/ school/ purchased)

What county do you live in? _____

Do you belong to a church / religious group? (Circle one answer)	Yes	No
---	------------	-----------

Do you smoke cigarettes/ tobacco?	Yes	No
Does someone in your household smoke?	Yes	No

In general my health is excellent, very good, good, fair, or poor. (Circle one answer)				
Excellent	Very Good	Good	Fair	Poor

If you are a woman, were you ever diagnosed with gestational diabetes? (Circle one answer)	Yes	No	I am not a woman.
Have you ever been diagnosed with high blood pressure? (Circle one answer)		Yes	No
Have you ever been diagnosed with type 1 diabetes? (Circle one answer)		Yes	No
Have you ever been diagnosed with type 2 diabetes? (Circle one answer)		Yes	No
Are you physically active? (Circle one answer)		Yes	No

What is your weight status?	Find your height in the left column and then circle one box in the row.
------------------------------------	---

Height	Weight (lbs.)		
4' 10"	119-142	143-190	191+
4' 11"	124-147	148-197	198+
5' 0"	128-152	153-203	204+
5' 1"	132-157	158-210	211+
5' 2"	136-163	164-217	218+
5' 3"	141-168	169-224	225+
5' 4"	145-173	174-231	232+
5' 5"	150-179	180-239	240+
5' 6"	155-185	186-246	247+
5' 7"	159-190	191-254	255+
5' 8"	164-196	197-261	262+
5' 9"	169-202	203-269	270+
5' 10"	174-208	209-277	278+
5' 11"	179-214	215-285	286+
6' 0"	184-220	221-293	294+
6' 1"	189-226	227-301	302+
6' 2"	194-232	233-310	311+
6' 3"	200-239	240-318	319+
6' 4"	205-245	246-327	328+

Tell Us About Your Food and Nutrition Habits and Behaviors.

I feel that I am helping my body by eating more fruits and vegetables. (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
I may develop health problems if I do not eat fruit and vegetables. (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
I feel that I can eat fruit or vegetables as snacks. (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
I feel that I can buy more vegetables the next time I shop. (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
I feel that I can plan meals or snack with more fruit during the next week. (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
I feel that I can eat two or more servings of vegetables at dinner. (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)

I feel that I can plan meals with more vegetables during the next week. (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
I feel that I can add extra vegetables to casseroles and stews. (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
In your household who is in charge of what foods to buy? (Circle one answer)	I Am	Shared Decision	Other Person
In your household who is in charge of how to prepare the food? (Circle one answer)	I Am	Shared Decision	Other Person

How would you best describe your diet? (Circle one answer)				
Excellent	Very Good	Good	Fair	Poor

Which one statement best fits you? (Check one box only.)	
I am not thinking about eating more fruit.	
I am thinking about eating more fruit...planning to start within six months.	
I am definitely planning to eat more fruit in the next month.	
I am trying to eat more fruit now.	
I am already eating 3 or more servings of fruit a day	

Which one statement best fits you? (Check one box only.)	
I am not thinking about eating more vegetables.	
I am thinking about eating more vegetables...planning to start within six months.	
I am definitely planning to eat more vegetables in the next month.	
I am trying to eat more vegetables now.	
I am already eating 3 or more servings of vegetables a day.	

Do you eat more than one kind of fruit daily? (Circle only one.)			
Never	Sometimes	Often	Always

Do you eat more than 1 kind of vegetable in a day? (Circle only one.)			
Never	Sometimes	Often	Always

During the past week, did you have citrus fruit (such as orange or grapefruit) or citrus juice?	Yes	No
(Circle one.)		

How many servings of vegetables do you eat each day?	Number_____
---	-------------

Do you eat 2 or more servings of vegetables at your main meal? Sometimes, often, always, or never?			
(Circle one.)			
Sometimes	Often	Always	Never

Do you eat fruit or vegetables as snacks?	Yes	No
(Circle one.)		
How many servings of fruits do you eat each day?	Number_____	

Over the past five years, has your daily produce intake changed? (Circle only one.)			
No, it is the same as it is now.	Yes, it has decreased.	Yes, it has increased.	Don't know.
If you answered "yes," please answer the following questions about your produce intake over the past five years.			
Over the past five years, how many servings of vegetables have you eaten, on average, each day?	Number_____		
Over the past five years, how many servings of fruit have you eaten, on average, each day?	Number_____		

Which one statement best fits you?	
(Check one box only.)	
I am not thinking about gardening to grow vegetables for my household.	
I am thinking about gardening to grow vegetables for my household. ...planning to start within six months	
I am definitely planning to garden to grow vegetables for my household in the next month.	
I am trying to garden to grow vegetables for my household.	
I am already gardening to grow vegetables for my household.	
Which one statement best fits you?	
(Check one box only.)	
I am not thinking about gardening to grow fruits for my household.	
I am thinking about gardening to grow fruits for my household. ...planning to start within six months	
I am definitely planning to garden to grow fruits for my household in the next month.	
I am trying to garden to grow fruits for my household.	
I am already gardening to grow fruits for my household.	

Which of these statements best describes the food eaten in your household in the last 12 months?	
(Check one box only.)	
Enough of the kinds of food I/we want to eat	
Enough but not always the kinds of food I/we want	
Sometimes not enough to eat	
Often not enough	
Don't Know or Refused	

Here are some reasons why people don't always have enough to eat. For each one, please tell me if that is a reason why YOU don't always have enough to eat.	Yes	No	Don't Know
Not enough money for food			
Not enough time for shopping or cooking			
Too hard to get to the store			
On a diet			
No working stove available			
Not able to cook or eat because of health problems			

Here are some reasons why people don't always have the quality or variety of food they want. For each one, please tell me if that is a reason why YOU don't always have the kinds of food you want to eat.	Yes	No	Don't Know
Not enough money for food			
Kinds of food (I/we) want not available			
Not enough time for shopping or cooking			
Too hard to get to the store			
On a special diet			

In the past 12 months, (I/we) worried whether (my/our) food would run out before (I/we) got money to buy more.			
(Circle only one.)			
Often true	Sometimes true	Never true	Don't Know or Prefer Not to Answer

<p>In the past 12 months, the food that (I/we) bought just didn't last, and (I/we) didn't have money to get more.</p> <p style="text-align: right;">(Circle only one.)</p>			
Often true	Sometimes true	Never true	Don't Know or Prefer Not to Answer

<p>In the past 12 months, (I/we) couldn't afford to eat balanced meals.</p> <p style="text-align: right;">(Circle only one.)</p>			
Often true	Sometimes true	Never true	Don't Know or Prefer Not to Answer

<p>In the past 12 months, did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?</p> <p style="text-align: right;">(Check one box only)</p>				
Yes. Almost every month	Yes. Some months but not every month	Yes. Only 1 or 2 months	No.	Don't Know or Prefer Not to Answer

<p>In the past 12 months, did you (personally) ever eat less than you felt you should because there wasn't enough money to buy food?</p> <p style="text-align: right;">(Check one box only)</p>		
Yes	No	Don't Know or Prefer Not to Answer

<p>In the past 12 months, were you (personally) ever hungry but didn't eat because you couldn't afford enough food?</p> <p style="text-align: right;">(Check one box only)</p>		
Yes	No	Don't Know or Prefer Not to Answer

<p>In the past 12 months, did you (personally) lose weight because you didn't have enough money for food?</p> <p style="text-align: right;">(Check one box only)</p>		
Yes	No	Don't Know or Prefer Not to Answer

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

(Check one box only)

Yes. Almost every month	Yes. Some months but not every month	Yes. Only 1 or 2 months	No.	Don't Know or Prefer Not to Answer
-------------------------	--------------------------------------	-------------------------	-----	------------------------------------

Thank you for participating in our survey!

Appendix E

Cultivating Healthy Communities: Using Farmers' Markets as an Avenue for Education to Improve Health while Fostering Community Economic Development
Post-Survey

Completion of this survey is completely voluntary and may cease at any time. No one will be able to identify you in any report resulting from this survey.

Tell Us About You.

How old are you? _____

What is your race? (Circle all that apply)					
American Indian or Native Alaskan	Asian Native	Black or African American	Hispanic	Hawaiian or Other Pacific Islander	White
Other (Please specify.)					

What is your current marital status? (Circle one answer)				
Married	Widowed	Divorced	Separated	Single/Never Married
If not married, do you have a live-in partner? Yes No				

Including you, how many people live in your household?	_____ adults
	_____ children 18 yrs & younger

What is your highest level of education completed?	
(Check one box only)	
Less than High School	
High School Graduate – high school DIPLOMA or the equivalent (GED)	
Some College or Higher	

What is your occupation type?	
(Check one box only)	
Working full-time (35 or more hours per week)	
Working part-time (fewer than 35 hours per week)	
Unemployed	
Student (either full or part-time)	
Social Security Disability	
Applying for Social Security	
Retired	
Other (Please explain)	

Which of the following best describes your current living arrangement?	
(Check one box only)	
I live with immediate family members (parents, brothers, sisters)	
I live with my partner/significant other/spouse	
I live with relatives (cousins, aunt or uncle, etc.)	
I live with a friend (or friends)	
I live alone	

Do you currently have health insurance? (Circle one answer)		
No coverage/ self-pay	Medicaid or Medicare only	Private insurance only (job/ school/ purchased)

What county do you live in? _____

Do you belong to a church / religious group? (Circle one answer)	Yes	No
---	------------	-----------

Do you smoke cigarettes/ tobacco?	Yes	No
Does someone in your household smoke?	Yes	No

In general my health is excellent, very good, good, fair, or poor. (Circle one answer)				
Excellent	Very Good	Good	Fair	Poor

If you are a woman, were you ever diagnosed with gestational diabetes? (Circle one answer)	Yes	No	I am not a woman.
Have you ever been diagnosed with high blood pressure? (Circle one answer)		Yes	No
Have you ever been diagnosed with type 1 diabetes? (Circle one answer)		Yes	No
Have you ever been diagnosed with type 2 diabetes? (Circle one answer)		Yes	No
Are you physically active? (Circle one answer)		Yes	No

What is your weight status?	Find your height in the left column and then circle one box in the row.
------------------------------------	---

Height	Weight (lbs.)		
4' 10"	119-142	143-190	191+
4' 11"	124-147	148-197	198+
5' 0"	128-152	153-203	204+
5' 1"	132-157	158-210	211+
5' 2"	136-163	164-217	218+
5' 3"	141-168	169-224	225+
5' 4"	145-173	174-231	232+
5' 5"	150-179	180-239	240+
5' 6"	155-185	186-246	247+
5' 7"	159-190	191-254	255+
5' 8"	164-196	197-261	262+
5' 9"	169-202	203-269	270+
5' 10"	174-208	209-277	278+
5' 11"	179-214	215-285	286+
6' 0"	184-220	221-293	294+
6' 1"	189-226	227-301	302+
6' 2"	194-232	233-310	311+
6' 3"	200-239	240-318	319+
6' 4"	205-245	246-327	328+

Tell Us About Your Food and Nutrition Habits and Behaviors.

I feel that I am helping my body by eating more fruits and vegetables. (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
I may develop health problems if I do not eat fruit and vegetables. (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
I feel that I can eat fruit or vegetables as snacks. (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
I feel that I can buy more vegetables the next time I shop. (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
I feel that I can plan meals or snack with more fruit during the next week. (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
I feel that I can eat two or more servings of vegetables at dinner. (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)

I feel that I can plan meals with more vegetables during the next week. (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
I feel that I can add extra vegetables to casseroles and stews. (Circle one answer)	Agree (Yes)	Agree or Disagree (Maybe)	Disagree (No)
In your household who is in charge of what foods to buy? (Circle one answer)	I Am	Shared Decision	Other Person
In your household who is in charge of how to prepare the food? (Circle one answer)	I Am	Shared Decision	Other Person

How would you best describe your diet? (Circle one answer)				
Excellent	Very Good	Good	Fair	Poor

Which one statement best fits you? (Check one box only.)	
I am not thinking about eating more fruit.	
I am thinking about eating more fruit...planning to start within six months.	
I am definitely planning to eat more fruit in the next month.	
I am trying to eat more fruit now.	
I am already eating 3 or more servings of fruit a day	

Which one statement best fits you? (Check one box only.)	
I am not thinking about eating more vegetables.	
I am thinking about eating more vegetables...planning to start within six months.	
I am definitely planning to eat more vegetables in the next month.	
I am trying to eat more vegetables now.	
I am already eating 3 or more servings of vegetables a day.	

Do you eat more than one kind of fruit daily? (Circle only one.)			
Never	Sometimes	Often	Always

Do you eat more than 1 kind of vegetable in a day? (Circle only one.)			
Never	Sometimes	Often	Always

During the past week, did you have citrus fruit (such as orange or grapefruit) or citrus juice?	Yes	No
(Circle one.)		

How many servings of vegetables do you eat each day?	Number_____
---	-------------

Do you eat 2 or more servings of vegetables at your main meal? Sometimes, often, always, or never?			
(Circle one.)			
Sometimes	Often	Always	Never

Do you eat fruit or vegetables as snacks?	Yes	No
(Circle one.)		
How many servings of fruits do you eat each day?	Number_____	

Over the past five years, has your daily produce intake changed? (Circle only one.)			
No, it is the same as it is now.	Yes, it has decreased.	Yes, it has increased.	Don't know.
If you answered "yes," please answer the following questions about your produce intake over the past five years.			
Over the past five years, how many servings of vegetables have you eaten, on average, each day?	Number_____		
Over the past five years, how many servings of fruit have you eaten, on average, each day?	Number_____		

Which one statement best fits you?	
(Check one box only.)	
I am not thinking about gardening to grow vegetables for my household.	
I am thinking about gardening to grow vegetables for my household. ...planning to start within six months	
I am definitely planning to garden to grow vegetables for my household in the next month.	
I am trying to garden to grow vegetables for my household.	
I am already gardening to grow vegetables for my household.	
Which one statement best fits you?	
(Check one box only.)	
I am not thinking about gardening to grow fruits for my household.	
I am thinking about gardening to grow fruits for my household. ...planning to start within six months	
I am definitely planning to garden to grow fruits for my household in the next month.	
I am trying to garden to grow fruits for my household.	
I am already gardening to grow fruits for my household.	

Which of these statements best describes the food eaten in your household in the last 12 months?	
(Check one box only.)	
Enough of the kinds of food I/we want to eat	
Enough but not always the kinds of food I/we want	
Sometimes not enough to eat	
Often not enough	
Don't Know or Refused	

Here are some reasons why people don't always have enough to eat. For each one, please tell me if that is a reason why YOU don't always have enough to eat.	Yes	No	Don't Know
Not enough money for food			
Not enough time for shopping or cooking			
Too hard to get to the store			
On a diet			
No working stove available			
Not able to cook or eat because of health problems			

Here are some reasons why people don't always have the quality or variety of food they want. For each one, please tell me if that is a reason why YOU don't always have the kinds of food you want to eat.	Yes	No	Don't Know
Not enough money for food			
Kinds of food (I/we) want not available			
Not enough time for shopping or cooking			
Too hard to get to the store			
On a special diet			

In the past 12 months, (I/we) worried whether (my/our) food would run out before (I/we) got money to buy more.			
(Circle only one.)			
Often true	Sometimes true	Never true	Don't Know or Prefer Not to Answer

In the past 12 months, the food that (I/we) bought just didn't last, and (I/we) didn't have money to get more.			
(Circle only one.)			
Often true	Sometimes true	Never true	Don't Know or Prefer Not to Answer

In the past 12 months, (I/we) couldn't afford to eat balanced meals.			
(Circle only one.)			
Often true	Sometimes true	Never true	Don't Know or Prefer Not to Answer

In the past 12 months, did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?				
(Check one box only)				
Yes. Almost every month	Yes. Some months but not every month	Yes. Only 1 or 2 months	No.	Don't Know or Prefer Not to Answer

In the past 12 months, did you (personally) ever eat less than you felt you should because there wasn't enough money to buy food?		
(Check one box only)		
Yes	No	Don't Know or Prefer Not to Answer

In the past 12 months, were you (personally) ever hungry but didn't eat because you couldn't afford enough food?		
(Check one box only)		
Yes	No	Don't Know or Prefer Not to Answer

In the past 12 months, did you (personally) lose weight because you didn't have enough money for food?		
(Check one box only)		
Yes	No	Don't Know or Prefer Not to Answer

<p>In the past 12 months, did (you/you or other adults in your household) ever not eat for a whole day because there wasn't enough money for food?</p> <p style="text-align: right;">(Check one box only)</p>				
Yes. Almost every month	Yes. Some months but not every month	Yes. Only 1 or 2 months	No.	Don't Know or Prefer Not to Answer

Tell us about our program this summer.

<p>How would you describe the cookbook that you received at the beginning of the program?</p> <p style="text-align: right;">(Circle one answer)</p>				
Excellent	Very Good	Good	Fair	Poor

<p>How would you describe the kitchen gadgets that you received during the program the program?</p> <p style="text-align: right;">(Circle one answer)</p>				
Excellent	Very Good	Good	Fair	Poor

<p>How would you describe the \$3 incentives that you received during the program the program?</p> <p style="text-align: right;">(Circle one answer)</p>				
Excellent	Very Good	Good	Fair	Poor

<p>During the program, did spend the \$3 on produce at the farmers' market?</p> <p style="text-align: right;">(Check one box only)</p>				
Yes. Almost every week	Yes. Some weeks but not every week	Yes. Only 1 or 2 weeks	No.	Don't Know or Prefer Not to Answer

During the program, did try a new vegetable or fruit at the farmers' market? (Check one box only)				
Yes. Almost every week	Yes. Some weeks but not every week	Yes. Only 1 or 2 weeks	No.	Don't Know or Prefer Not to Answer

During the program, did try a different vendor at the farmers' market? (Check one box only)				
Yes. Almost every week	Yes. Some weeks but not every week	Yes. Only 1 or 2 weeks	No.	Don't Know or Prefer Not to Answer

What was your favorite part of the program? (Check one box only)				
Cooking demonstrations	Food and nutrition education at the booth	Free cookbook	Free kitchen gadgets	The \$3 each week to buy produce

Thank you for participating in our survey!

Appendix F

Scoring Rubric for Household Adult Food Security Survey Module

Number of Positive Questions/ Responses	Scale Score	USDA Food Security Category (Label)	USDA Food Security Category (Dichotomous)	Fully Food Secure versus Not Fully Food Secure
0	0.0	High Food Security	Food Secure	Fully Food Secure
1	1.2	Marginal Food Security		Not Fully Food Secure
2	2.2			
3	3.0	Low Food Security	Food Insecure	Not Fully Food Secure
4	3.7			
5	4.4	Very Low Food Security	Food Insecure	Not Fully Food Secure
6	5.0			
7	5.7			
8	6.4			
9	7.2			
10	7.9			

(Bickel et al., 2000; USDA 2016).