Georgia State University

ScholarWorks @ Georgia State University

Public Health Theses

School of Public Health

8-13-2013

Income Payment Structure and its Influence on Food Security and Fruit Consumption

Shelley M. Mays

Follow this and additional works at: https://scholarworks.gsu.edu/iph_theses

Recommended Citation

Mays, Shelley M., "Income Payment Structure and its Influence on Food Security and Fruit Consumption." Thesis, Georgia State University, 2013.
https://scholarworks.gsu.edu/iph_theses/294

This Thesis is brought to you for free and open access by the School of Public Health at ScholarWorks @ Georgia State University. It has been accepted for inclusion in Public Health Theses by an authorized administrator of ScholarWorks @ Georgia State University. For more information, please contact scholarworks@gsu.edu.

ABSTRACT

SHELLEY MAYS
Income Payment Structure and its Influence on Food Security and Fruit Consumption
(Under the direction of Dr. Ike Okosun, Faculty Member)

Background: Despite the growing evidence of the positive effects of fruit consumption on health, many individuals do not consume the recommended dietary guideline amounts. It has been suggested that socioeconomic status and income have an influence on food choices and consumption. The aim of this study is not only to examine whether payment structure has an association with food choices but also to assess fruit consumption independent of vegetables in the US.

Methods: The 2011 Behavioral Risk Factor Surveillance System was utilized and the study design led to a sample size that was n= 19,122 respondents. Variables that were selected for associations with sufficient fruit consumption included demographic data, employment status, payment structure, education, and home ownership status. A p-value of <0.05 and 95% confidence intervals were used to determine statistical significance of the analyses performed.

Results: Factors that were associated with greater odds of sufficient fruit consumption included being African-American, education- all levels of high school graduate and higher, all income categories above $15,000 annually, those employed, and those who rent a home (p-value<0.01). Multivariate logistic regression analysis indicated that respondents' education defined as having college education was associated with increased odds of sufficient fruit consumption (OR = 7.09: CI =1.86-27.09] (p-value<0.01).

Conclusions: Assessing fruit consumption alone did not provide greater insight on sufficiency with the exception of race's (specifically African American) influence. Payment structure was found not associated with increased fruit consumption. Promotion of education on the relevance of fruit consumption to overall health is critical and necessary in the United States.

INCOME PAYMENT STRUCTURE AND ITS INFLUENCE ON FOOD SECURITY AND FRUIT CONSUMPTION

By

SHELLEY MAYS
B.S. EXERCISE PHYSIOLOGY
GEORGIA STATE UNIVERSITY

A Thesis Submitted to the Graduate Faculty
of Georgia State University in Partial Fulfillment
of the
Requirements for the Degree

MASTER OF PUBLIC HEALTH

ATLANTA, GEORGIA
30303

APPROVAL PAGE

INCOME PAYMENT STRUCTURE AND ITS INFLUENCE ON FOOD SECURITY AND FRUIT CONSUMPTION

By

SHELLEY MAYS

Approved:

Ike S. Okosun PhD

Committee Chair:

Murugi Ndirangu PhD

Date July 30, 2013

Acknowledgements

I would like to extend my greatest appreciation to my thesis chair, Dr. Ike Okosun. It was through his guidance, support and encouragement that I was able to complete such a huge undertaking. I appreciate all the drop-in meetings that he was always welcoming and encouraging me throughout this entire process. I would also like to thank Dr. Ndirangu who gave me guidance and support even when she was not in the country. I owe special thanks to Dr. Sterling- I appreciate you being able to sit-in for my defense on such short notice.

I would also like to thank Dr. Lilly Immergluck for extending me some professional freedom so that I was able to conduct this study and report its findings. I would also like to extend my thanks to Anaam Mohammed, Trisha Chan and Elham Laghaie for their valuable input and assistance while I was working on this project.

I also must acknowledge that this thesis and my entire graduate career would not be possible without Mandy Conner. I appreciate everything that you do and cannot possibly do justice for all the opportunities for growth (both personally and professionally) that you have been able to provide for me. Finally, I would like to thank the School of Public Health for inspiring and providing a wonderful educational experience through amazing faculty members.

Author's Statement Page

In presenting this thesis as a partial fulfillment of the requirements for an advanced degree from Georgia State University, I agree that the Library of the University shall make it available for inspection and circulation in accordance with its regulations governing materials of this type. I agree that permission to quote from, to copy from, or to publish this thesis may be granted by the author or, in his/her absence, by the professor under whose direction it was written, or in his/her absence, by the Associate Dean, College of Health and Human Sciences. Such quoting, copying, or publishing must be solely for scholarly purposes and will not involve potential financial gain. It is understood that any copying from or publication of this dissertation which involves potential financial gain will not be allowed without written permission of the author.

Shelley Mays
Signature of Author

Notice to Borrowers Page

All theses deposited in the Georgia State University Library must be used in accordance with the stipulations prescribed by the author in the preceding statement.

The author of this thesis is:

Student's Name: Shelley Mays

Street Address: 41 Atlanta Ave SE

City, State, and Zip Code: Atlanta, GA 30315

The Chair of the committee for this thesis is:

Professor's Name: Dr. Ike Okosun

Department: Institute of Public Health

College: Health and Human Sciences

Georgia State University
P.O. Box 3995
Atlanta, Georgia 30302-3995

Users of this thesis who not regularly enrolled as students at Georgia State University are required to attest acceptance of the preceding stipulation by signing below. Libraries borrowing this thesis for the use of their patrons are required to see that each user records here the information requested.

NAME OF USER	ADDRESS	DATE	TYPE OF USE (EXAMINATION ONLY OR COPY)

TABLE OF CONTENTS

List of Tables

List of Figures

Chapter I
INTRODUCTION

1.1 Background

Despite the growing evidence of the positive effects of fruit and vegetable consumption on health, many individuals do not consume the recommended dietary guideline amounts. Many people who have inadequate fruit and vegetable consumption are likely to develop poor chronic health conditions. The consequences associated with inadequate fruit and vegetable consumption on health are well known. Inadequate fruit and vegetable consumption is associated with 2.7 million annual overall deaths, 11% of strokes, 31% of ischemic heart disease and 19% of gastrointestinal cancers (Azagba and Sharaf, 2011). All of these chronic health issues are challenges for the public health workforce in terms of prevention, treatment and subsequent management of disease.

In 2009, the percent of adults consuming fruit at least two times daily was 32.5% and vegetables at least three times a day was 26.3% (BRFSS, 2009). These statistics indicate that a substantial proportion of Americans are not eating adequate amounts of fruits and vegetables to meet dietary guidelines. Increasing fruit and vegetable consumption has been a major priority for maintenance of good health and the prevention of diseases in the US. Several studies have indicated that diets rich in fruits and vegetables are negatively associated with hypertension, diabetes and strokes (Bazanno, 2006). Obesity and overweight pose huge threats to the long-term health of people in the US, and the continued consumption of westernization of diets also threatens people around the globe. Several goals of Healthy People 2020 address fruit and vegetable consumption as a means of nutrient dense foods to help maintain healthy weight and prevention of obesity related diseases (USDHHS, 2010).

Fruits are key components of chronic disease prevention for hypertension, coronary heart disease, some cancers and may additionally aid in healthy weight management (Grimm, 2012). Studies assessing nutrition and socioeconomic status (SES) frequently combine fruits and vegetables into a single category rather than assessing them individually. However, fruits and vegetables inherently have differing properties, which benefit the body in different ways. Ascorbic acid (or vitamin C) is one of these compounds that are frequently found in fruits consumed in the US (Pincemail, 2012). Fruits also contain antioxidants that aid cell repair processes.

Payment, or the receipt of money for labor within the workforce, may be structured in various ways. The way an individual is paid influences their perceived income security. For example, an individual who is paid by an annual salary is aware of the amount of money that will be received every month. Conversely, a person who is paid by commission is reliant on selling or providing a service for which they are paid. People who are paid hourly are aware of what their pay rate is but may not be guaranteed a certain set amount of hours and so their weekly or monthly income may vary. Salaried persons would therefore have a better sense of income security as their income will not fluctuate as someone who receives income from commission or hourly pay may. There is a lack of literature that assesses whether the way someone is paid influences their fruit intake, and is therefore one of the aims of this study.

1.2 Purpose of Study

The purpose of this study is not only to examine whether payment types has an association with food choices but also to assess fruit consumption independent of vegetables. It

is well documented that most Americans do not consume the five-a-day recommended servings of fruits and vegetables, but little is published on fruits alone as a means of adequate healthy food consumption. The purpose of this study is to examine fruit consumption alone to see if there is conflicting evidence when comparing with other previous studies that assess fruit and vegetable consumption associations with income security.

1.3 Research Questions

I. Is a more stable income security and structure associated with increased fruit consumption?

II. Does assessing fruit consumption alone reveal differences of sufficient healthy food consumption in comparison to the literature that analyze fruit and vegetable consumption together as a measure of sufficient consumption?

Chapter II

REVIEW OF THE LITERATURE

2.1 Socioeconomic Status and Fruit Consumption Challenges

Many studies have shown that socioeconomic status (SES) and total income have an influence on food choices and consumption. The literature suggests that those who have lower SES are less likely to consume fresh fruits and vegetables (Azagba and Sharaf, 2011). One reason why people of lower SES may be less likely to consume fruits is that, healthier food is often more expensive than less healthy food and so higher food prices may lead to less healthier food choices (Cummings and Mcintyre, 2006). Another reason for decreased fruit consumption is that fresh food is perishable and may not last as long as some other foods making it less desirable when resources for food may become scarce. A longer shelf life of such food products makes them much more available to areas and retailers that may not have the resources to handle or carry perishable fruits for their communities. Examples of retailers that may not have the capacity to carry such foods include convenience stores, liquor stores and gas stations, which often are the main sources of food in impoverished and lower SES communities.

Consumption of foods that are higher in fat and sugar content may lead to being overweight or obese, which have serious health consequences. Some of the unhealthier foods are of particular concern because they tend to be energy-dense foods (that are typically more processed with higher fat and sugar contents)which frequently are cheaper than their more nutritious counterparts.

2.2 Income Security and Food Security

There are very few studies that only measure fruit consumption when assessing nutrition and fresh food choices. Income security is the reception of money on a regular and consistent

basis which is usually acquired from labor. People who have fewer resources or diminished access are considered to be food insecure. The purpose of this study is to determine whether payment or income structure influences people's fruit consumption. Income structures can include paid salary, paid hourly, paid by job/task or paid some other way. Other measures of income security (i.e. home ownership and employment status) were assessed in this analysis as well.

Food security is a multifaceted phenomenon; it is a measure of access and resources to healthy and nutritious food. One component of access can mean whether there is a source of healthy food in their environment or community, such as a supermarket or farmers market. There are many areas in the US, both rural and urban, that do not have proximal access to fruits and vegetables. These areas are referred to as food deserts. The definition of a food desert as deemed by Furey et al. (2001) is "an area where people do not have easy access to healthy, fresh foods, particularly if they are poor and have limited mobility." Food deserts and food insecurity are associated with areas of low SES. The lack of access to healthy food retailers makes it difficult for people in these areas to purchase and eat fruits.

Another component that diminishes potential consumption of healthy food is the lack of access to public or private transportation to get to fresh food sources. Lack of transportation to sources of fruit makes people food insecure, even if they have sufficient means to purchase it. The opposite may also occur where transportation is available but inadequate resources are a limiting factor for purchase and consumption. In some cases, both of the scenarios occur simultaneously in which food insecurity is particularly dire. Recent study has found that neighborhood food environments may have influence on fruit and vegetable consumption in the

US (Baker et al, 2006). Access to healthy food retailers and farmers markets remains a challenge for many people in the US.

Food insecurity also puts people who are insecure at a disproportionate likelihood of being obese and suffering from chronic diseases that are influenced by overweight and obesity. One study assessed food insecurity in 12 US states and found that the overall prevalence of obesity in those states was 27.1%, 25.2% amongst food secure individuals and 35.1% ($p<0.001$) among food insecure adults (Pan et al, 2012). There was an increased odds of 32% to being obese in food insecure adults compared to their secure counterparts. That is a substantial increased risk for secondary chronic disease- of which these food insecure groups probably also have fewer resources to be able to treat and maintain any sequelae from such diseases.

The BRFSS in 2009 included a food insecurity question in the Social Context module that measured food stress and security. The question asked in the survey was "How often in the past 12 months would you say you were worried or stressed about having enough money to buy nutritious meals?" This question was asked of the respondents and they also reported their weight and height. The respondents' BMI was calculated to see if there was a higher proportion of persons who were obese that had more food stress and insecurity. The public health implications for food insecure people are substantial- particularly for those who reside in low SES areas.

2.3 Food Cost

Food cost may also decrease fruit and vegetable consumption. The US Department of Agriculture (USDA) found in one study that a person could purchase enough fruit and vegetables to meet the 2010 Dietary Guidelines for Americans (DGA) at an expenditure of $2 to $2.50 daily (Hyman, 2011). For a family of four this equals as much as $280 per month

or $3,640 per year. This may be an unrealistic expenditure for many families to meet the dietary guidelines for Americans. One study indicated that actual consumption, for people of lower SES, depends on the real pattern of fruit and vegetable prices (Capacci, 2011).

Income and its structure (how someone is paid) influence the total amount of resources that people have to put towards food. It would seem that families that had a more stable income such as salary pay would have an easier time allocating funds for healthy food because they know how much income they had every week or every month. People who may have less stability in their pay may be less apt to purchase perishable items as they may not know how much income they will have or when they will have their next source of payment. Commission employees (or fee for service) and hourly pay recipients are not guaranteed a certain number of jobs or hours respectively, and have less income security than their salaried counterparts. It is also important to note that most salaried positions probably have a higher overall annual income than commission or hourly paid employees.

2.4 Race and Cultural Influences on Food Choices

Disparities are frequent in minority races and cultures in the US. African American communities are frequently located in areas of lower socioeconomic status and have their own inherent challenges with access to healthier foods in such communities. Despite these challenges, it seems that race and culture may be able to subdue the influence of diminished access and resources. Previous study has determined that minority groups are more likely to consume fruits and that whites were more likely to consume vegetables (Grimm, 2012).

An individuals' culture may have an important influence on what particular types of foods are consumed. Food preparation and practices that occur in one's culture may have a positive impact on the consumption of fruits. This means that if one's culture frequently uses

fruits for cultural-specific traditions or taste preferences they may be more likely to have adequate fruit consumption.

Chapter III

METHODOLOGY

3.1 History of the Behavioral Risk Factor Surveillance System and Data

Scientific research showed a clear association between personal behaviors and some chronic diseases morbidity and mortality. There was a lack of knowledge of personal behaviors of citizens of the country and individual states in the 1980s. The US populations' behavior was not well understood and the Centers for Disease Control and Prevention (CDC) wanted to develop a comprehensive system to understand health risk behaviors that may impact people's long term morbidity and mortality. CDC had access to some national survey data through the National Center for Health Statistics (NCHS) but it was not state-specific. State health agencies and CDC recognized the limitations of the data from NCHS and wanted to design a tool that could help target areas and resources where they were most needed.

Telephone surveys had become more recognized as acceptable means of interviewing subjects and became the primary way that state and local behavior surveys were conducted. The CDC established the Behavioral Risk Factor Surveillance System (BRFSS) in 1984, and fifteen states participated in data collection. The surveys administered were standardized by CDC and were given by the individual states via landline. The BRFSS became a nationwide system of surveillance in 1993, in which a core questionnaire was utilized for comparable data throughout the country. The states had the choice to administer optional modules that are sets of specific questions on a particular topic in addition to the core questionnaire. Data are currently collected in all 50 states, the District of Columbia, Puerto Rico, American Samoa, Palau the US Virgin Islands and Guam. The findings of the BRFSS have led to the development of public health policies to address the challenges of their residents.

States have also used the BRFSS to identify emerging health issues and stressors that need to be addressed. The impact of vaccine shortages, H1N1 pandemic and problems that occurred after Hurricanes Katrina and Rita were all addressed in the BRFSS. The BRFSS added a web-enabled analysis tool to allow users to perform logistic regression and cross tabulations. . One study estimated that approximately 31.6% of households only use cell phones (Blumberg). In reaction to this, the BRFSS started to contact cell phone users in 2009 because they were concerned that the dwindling number of landline users may affect the representativeness of the whole US adult population. Most recently, there were more than 500,000 interviews conducted in 2011, making the BRFSS the largest telephone survey in the world. (CDC, 2013)

The data used to assess the income security and fruit and vegetable consumption associations are from the 2011 Behavioral Risk Factor Surveillance System or BRFSS. Different components of the BRFSS were analyzed. Areas of the BRFSS that were examined included demographic information, various measures of income security including payment type, home ownership status and social contexts, in addition to fruit and vegetable consumption. It is important to note that the results from the 2011 BRFSS should not be compared to previous years as the weighing process and data collection processes have changed and are therefore not compatible with previous years.

3.2 Sample Size

In 2011, BRFSS interviewed 506,467 people and measured 454 different variables. Some of the variables were included in the state- elected optional modules and were not a part of the CDC's core questionnaire. For this study, items on the BRFSS that did not pertain to demographic data, fruit consumption, or from the Social Context Module 28 were eliminated from analysis, as they were either irrelevant to this analysis or beyond the scope of this paper.

The study sample was reduced by eliminating persons over the age of 65 years to 350,377. The 65+ age group was eliminated in order to avoiding skewing of the data with regards to salary/retirement/pension as this may over-represent the true number of salaried persons in the population. There were also many subjects in this age group who may or may not be working because of their eligibility for social security and/or desire to retire.

It was important to have the study population's employment status in order to be able to assess payment structure and its associations with fruit consumption. The sample size was reduced to 242,452 respondents by eliminating unknown employment status. The final limiting factor was information about fruit consumption, which brought the final sample down to n = 19,122 respondents.

3.3 Variables

The 2011 Behavioral Risk Factor Surveillance System asks respondents the number of fruits they consume daily. The types of fruits that were counted are fresh fruit, 100% fruit juices, dried or frozen fruits. The US dietary guidelines were utilized to determine the parameters of sufficient or insufficient fruit consumption. Therefore, two or more fruits servings per day were categorized as sufficient and less than two fruit servings daily were insufficient. Any and all missing/refused information from any of the variables was eliminated from the analysis. Race was transformed into three separate categories, white, black and other. Races in the other category included Asian, Pacific Islander, Native American, other, unsure and multiracial. Hispanics were also not assessed as that particular ethnicity was a separate question in the BRFSS and did not indicate the race of those respondents (e.g. white, black or other).

The parameters for employment were stratified into two categories. Those who work for wages or were self-employed were considered employed. Persons who were out of work for less

than a year or more were stratified as unemployed. Students and homemakers were not included as they do not receive wages and therefore, could not be assessed by payment structure. Payment structure had been stratified by the BRFSS as salaried (salary), hourly, fee for job/task or commission (fee for service), or paid by some other way (other). All of the other variables had been stratified by the BRFSS and were analyzed as they were designated. Fruit consumption had been calculated by amounts consumed per day and was analyzed as such.

3.4 Statistical Methods

Statistical programs available for SPSS version 19 for Windows were utilized for this analysis. Differences between subjects with insufficient fruit consumption and subjects with sufficient fruit consumption for continuous and categorical variables were assessed by independent *t*-test and χ-square statistics, respectively.

Univariate and multivariate logistic regression analysis were performed using self-reported fruit consumption (coded as 1 for sufficient and 2 for insufficient) as the dependent variable, Sex (coded as male as 1 and female as 2), age (18-24 as 1, 25-34 as 2, 35-44 as 3 45-54 as 4, 55-64 as 5 and 65+ as 6), marital status (married as 1, divorced as 2, widowed as 3, separated as 4, never married as 5, and member of unmarried couple as 6), race (white as 1, black as 2, and other as 3), education (coded as less than high school diploma as 1, high school graduate/GED as 2 some college as 3 and college graduate or higher as 4) and annual income (coded as 1 for <$15,000, 2 as $15,000 to <$25,000, 3 as $25,000 to < $35,000 and 4 as $35,000 to <$50,000 and 5 as $50,000+), employment status (employed as 1 and unemployed as 2), payment structure (salary as 1, hourly as 2, fee for service as 3, and other as 4), home ownership (own as 1, rent as 2) as the independent variable, adjusting for age, gender, marital status, race,

education, income, and payment structure. The first variable in each category was utilized as the referent group.

Chapter IV

RESULTS

4.1 Descriptive Statistics

Table 1 portrays the descriptive statistics of the eligible subjects (n =19,122) aged 18 – 65 years from selected demographic data from the 2011 BRFSS. All the categories had existing data in them and there were no overly sampled categories represented in the data set. Table 2 contained descriptive characteristics of the respondents' measures of income data. All of the variables had data in them and were consistent with previous years BFRSS data.

Figures 1 and 2 show the prevalence of insufficient fruit consumption among all participants (n = 19,122) by payment structure and employment status. Respondents who were paid by fee for service had the highest proportion of insufficient fruit consumption at 90.9%, followed by hourly pay (.786), salary (.771) and paid some other way (.667) with the lowest prevalence ($p < 0.01$). In figure 2 the percentile of insufficient fruit consumption was highest in respondents that were unemployed (.816) versus employed (.789) ($p < 0.01$). The aim of Table 3 is illustrate the mean values of the various types of foods that respondents reported consuming from the 2011 BRFSS. It includes all the types of foods that the 2011 BRFSS inquired about including fruits and 100% fruit juices.

4.2 Univariate Analyses

Table 4 depicts the results of the univariate analysis of the covariates association with sufficient fruit consumption. The covariates include gender, age, marital status, race, education, income, employment status, payment structure and home ownership. As seen on table 4, males had an OR = 0.38 CI [0.35-0.44] to their female counterparts which was statistically significant

(p-value < 0.01). Age, payment structure and marital status did not have significant findings. Blacks had an OR = 2.40 CI [1.13-5.31] compared with whites (p-value < 0.01). High school graduates had an OR = 2.31 CI [1.87-2.84], respondents with some college had an OR = 2.02 CI [1.84-2.22] and college graduates had an OR = 1.42 CI [1.31-1.54] compared to non-high school graduates (p-value <0.01). Employed respondents had an OR = 1.19 CI [1.08-1.31] to their unemployed counterparts (p-value < 0.01). Home renters had an OR = 1.34 CI [1.14-1.57] compared with home owners (p-value < 0.01). It should be noted that all levels of education of high school graduation and beyond had statistically significant findings.

4.3 Multivariate Analyses

Table 5 shows the multivariate logistic regression analysis, which displays the relationship between fruit consumption while adjusting for the other covariates. Overall education was a significant variable; respondents with some college had an adjusted OR of 7.09 CI [1.86-27.09] with a p-value < 0.01. Thus, indicating that education has a statistically significant influence on sufficient fruit consumption.

4.4 Stepwise Logistic Regression

Table 6 displays the results of a stepwise logistic regression analysis of factors that are associated with sufficient fruit consumption. Using non-high school graduates as the reference group, high school graduates had an OR of 4.21 CI [0.88-20.05], some college had an OR of 5.16 [1.80-14.82] and college graduates had an OR of 1.96 [0.87-4.46].

Chapter V

DISCUSSION AND CONCLUSION

5.1 Discussion

The result of this study indicates that secure payment structures are not associated with increased fruit consumption. This finding is consistent with other studies that assessed jointly both fruit and vegetable consumption (Sugerman, 2011). The result of this study suggests that the strongest predictor of increased fruit consumption was education. Being a college graduate was found to be associated with increased odds of sufficient servings of daily fruits compared to a non-high school graduate.

Education is a measure of SES in other literature (Thorpe, 2013) and may explain such findings. Education has been one of the best predictors of general health and income. People who are more educated may have learned about the value of adequate nutrition and are more likely to consume fruits. People with more education also tend to make more money and may have more resources and purchasing power to be able to do so.

Studies indicate that persons of lower SES have diets that are the least consistent with recommended dietary guidelines (Turrell, 2007) (Metcalf, 2006) (Shahar, 2005) (De Irala-Estevez, 2000). Poorer dietary intake of people in lower SES groups partially contributes to their higher rates of morbidity and mortality for chronic diseases (James, 1997) (Davey, 1997). The effect of poor nutrition affects a disproportionate number of people within lower SES groups.

Race and culture may be a vital way to truly address inadequate healthy food choices. The univariate analyses indicated that African Americans were 2.4 (95% CI [1.13-5.31]) as likely as whites to consume sufficient quantities of fruits. Programs that address common food

preparation practices should be aware of being culturally-specific when making recommendation or guidelines so that they are within a sociative norm.

Education may be vital not only because it is associated with fruit consumption but because education itself may be helpful to convey the message of the benefits of regular fruit consumption on health. Education does have to be a measure of SES but a tool to inform people of the benefits of proper nutrition. Many public schools teach the food dietary guidelines to children so that they understand and will hopefully make wiser food choices at a younger age. Education programs that have been designed to help increase fruit and vegetable consumption (e.g. five-a-day) have shown some moderate success with helping to increase the actual number of fruits and vegetables.

5.2 Limitations

One of the main limitations of this study is that the BRFSS changed their format in 2011. They noted that findings from this year should be a baseline for future study. The two main reasons that they stated this was because of how they collected subjects (with a large increase in the number of cell phone users) and changes in the survey- the BRFSS added modules that were not in previous years' data. Comparison to previous years data should only be used a proxy in identifying trends from previous study. The study design of this analysis could be improved by assessing associations with fruits alone, vegetables alone and fruit and vegetables together.

5.3 Recommendations

The findings of this analysis were consistent with other literature sources. Education is a key component to people's future and as a tool to convey appropriate messages about the benefits of nutrition. Food prices also play a substantial role in healthy food choices.

Race and culture may be a key component to making realistic recommendations and guidelines for healthy food choices and preparations. Recommendations to minorities that consume more fruits (but fewer vegetables) should address ways to include more healthy foods without compromising taste and nutritive value that are culturally appropriate.

Implementing some sort of subsidy program or a way for people of lower SES to get discounted healthy foods (other than SNAP) so that access is widened is important. Continued use of educational programs and public service announcements may be effective to increase total fresh food consumption.

5.4 Conclusion

The results of this study are that secure payment structures are not associated with increased fruit consumption. The findings of the analysis of fruit consumption alone are consistent with other literature that assessed both fruit and vegetable consumption together. The strongest predictor of increased fruit consumption was education. Having a college education is associated with increased odds of sufficient consumption of fruits as indicated by significant odds ratio of 7.09 CI {1.86-27.09]).

REFERENCES

Azagba,S., Sharaf, M. Disparities in the frequency of fruit and vegetable consumption by socio-demographic and lifestyle characteristics in Canada. *Nutrition Journal* 2011, 10:118-124.

Baker, E., Schootman, M., Barnidge, E., Kelly C. The role of race and poverty in access to foods that enable individuals to adhere to dietary guidelines. *Prevention of Chronic Disease*, 2006; 3: A76

Bazzano, L: The high cost of not consuming fruits and vegetables. *Journal of the American Dietetic Association* 2006, 106(9): 1364-1368

Blumberg SJ, Luke JV. Wireless substitution: Early release of estimates from the National Health Interview Survey, January–June 2011. National Center for Health Statistics. December 2011. Available from http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201112.htm (cell phone quote)

Capacci, S. & Mazzocchi, M. (2011). Five-a-day, a price to pay: An evaluation of the UK program impact accounting for market forces. *Journal of Health Economics* 30, 87-98.

Centers for Disease Control and Prevention. (2013). About the Behavioral Risk Factor Surveillance System (BRFSS), March 2013. Division of Behavioral Surveillance. March 2013. Available from http://www.cdc.gov/brfss/about/about_brfss.htm (largest phone survey quote.)

Cummings, S., MacintyreS. Food Environments and Obesity—neighborhood or nation? *International Journal of Epidemiology* 2006; 35: 100-104.

Davey, S. & Brunner, E. (1997). Socioeconomic differentials in health: the role of nutrition. *Proceedings of the Nutrition Society* 56, 75-90.

De Irala-Estevez, J., Groth, M., Johansson, L., Oltersdorf, U., Prattala, R. & Martinez-Gonzalez, M. (2000). A systematic review of socioeconomic differences in food habits in Europe: consumption of fruit and vegetables. *European Journal of Clinical Nutrition* 54, 706-714

Furey, S., Strugnell, C., and McIlveen, H. (2001). An investigation of the potential existence of "food deserts" in rural and urban areas of Northern Ireland. *Agriculture and Human Values* Vol. 18, 447-457

Grimm, K., Foltz, J., Blanck, H. & Scanlon, K. Household Income Disparities in Fruit and Vegetable Consumption by State and Territory: Results of the 2009 Behavioral Risk Factor Surveillance System. *Journal of the Academy of Nutrition and Dietetics,* 2012; 112(12): 2014-2021.

Hyman, S., Buzby, F., Carlson, A., How Much Do Fruits and Vegetables Cost? Washington, DC: US Department of Agriculture, Economic Research Service; 2011.

James, W., Nelson, M., Leather, S. (1997). The contribution of nutrition to inequalities in health. *BMJ* 314, 1545-1549.

Metcalf, P., Scragg, R. & Davis, p. (2006) Dietary intakes by different markers of socioeconomic status: results of a New Zealand workforce survey. *New Zealand Medical Journal* 26 U2127

Pan, L. et. al., Food Insecurity Is Associated with Obesity among US adults in 12 States. *Journal of the Academy of Nutrition and Dietetics*, 2012; 112(9): 1403-1409.

Shahar, D., Shai, L., Vardi, H., Shahar, A. & Fraser, D. (2005). Diet and eating habits in high and low socioeconomic groups. *Nutrition* 21, 559-566

Sugerman, S., Foester, S., Gregson, J., Linares, A. & Hudes, M. (2011) California Adults Increase Fruit and Vegetable Consumption from 1997-2007. *Journal of Nutrition Education and Behavior* 43(4S2), S96-S103.

Thorpe Jr., R., Szanton, S., Bell, C., & Whitfield, K. (2013). Education, Income and Disability in African Americans. *Ethnicity & Disease*, 23(1), 12-17.

Turrell, G., Bentley, R., Thomas, L., Jolley, D., Subramanian, S., & Kavanaugh, A. (2009). A multilevel study of area socio-economic status and food purchasing behavior. *Public Health Nutrition*, 12(11), 2074-2083.

APPENDICES

Table 1. Descriptive characteristics of study population for selected demographic data from the 2011 Behavioral Risk Factor Surveillance System

Characteristic	**No. of respondents**	**Percentage %**	**Mean ± SD**
Total Overall	19,122		
Sex			
Male	8,589	44.9	
Female	10,533	55.1	
Age			45.9 ± 12.1
18-24	488	10.9	
25-34	921	20.6	
35-44	928	20.8	
45-54	1137	25.4	
55-64	944	21.1	
65+	54	1.2	
Marital Status			
Married	12440	65.1	
Divorced	2434	12.7	
Widowed	546	2.9	
Separated	366	1.9	
Never Married	2797	14.6	
Member of unmarried couple	502	2.6	
Race			
White	129	62.3	
Black	39	18.8	
Other	39	18.8	
Education			
Less than High School Graduate	821	4.3	
High School Graduate/GED	5169	27.1	
Some College	5857	30.7	
College Graduate	7260	38.0	
Fruit Consumption			
Sufficient (2 or more servings/day)	3943	20.7	
Insufficient (<2 servings/day)	15101	79.3	

Table 2. Descriptive characteristics of study population for selected measures of income data from the 2011 Behavioral Risk Factor Surveillance System

Characteristic	No. of respondents	Percentage %
Income		
<$15,000	665	3.7
$15,000 to <$25,000	1991	11.2
$25,000 to <$35,000	1909	10.7
$35,000 to <$50,000	3075	17.3
$50,000+	10146	57.0
Employment Status		
Employed	16,026	83.8
Unemployed	3096	16.2
Payment Structure		
Salary	6691	35.0
Hourly	9639	50.4
Fee for service (e.g. task, commission)	1473	7.7
Other	1319	6.9
Home Ownership		
Own	14926	80.9
Rent	3533	19.1

Table 3. Distribution of mean values of types of foods consumed as reported by respondents to the 2011 Behavioral Risk Factor Surveillance System

Food Consumed (in servings daily)	No. of Respondents	Mean	Standard Deviation
100% Fruit Juice	18949	0.35	±0.56
Fruit	19044	0.98	±0.93
Beans	19012	0.27	±0.36
Dark Green Vegetables	19073	0.50	±0.53
Orange-colored vegetables	19070	0.26	±0.34
Vegetables	19122	0.85	±0.98

Table 4. Univariate analysis of association with employment status and other selected variables with fruit consumption

Variable	Odds Ratio	95% Confidence Interval
Gender		
Male	0.38	0.35-0.44*
Age	0.99	0.99-1.00
Marital Status		
Married	1.00	Referent
Divorced	1.02	0.76-1.38
Widowed	1.23	0.88-1.72
Separated	1.46	0.85-2.49
Never Married	1.23	0.75-1.99
Member of unmarried couple	1.29	0.94-1.79
Race		
White	1.00	Referent
Black	2.40	1.13-5.31*
Other	1.61	0.64-4.31
Education		
Less than High School Graduate	1.00	Referent
High School Graduate/GED	2.31	1.87-2.84*
Some College	2.02	1.84-2.22*
College Graduate	1.42	1.31-1.54*
Income		
<$15,000	1.00	Referent
$15,000 to <$25,000	1.73	1.39-2.16*
$25,000 to <$35,000	1.615	1.42-1.83*
$35,000 to <$50,000	1.58	1.38-1.79*
$50,000+	1.29	1.16-1.42*
Employed	1.19	1.08-1.31*
Payment Structure		
Salary	1.00	Referent
Hourly	1.12	0.30-4.13
Fee for service (e.g. task, commission)	1.79	0.50-6.46
Other	1.50	0.29-7.81
Home Ownership		
Own	1.00	Referent
Rent	1.34	1.14-1.57*

* Indicates a p-value <0.01

Table 5. Multivariate analysis of association with employment status and other selected variables with fruit consumption

Variable	Odds Ratio	95% Confidence Interval
Gender		
Male	1.67	0.71-3.92
Age	1.03	0.99-1.07
Marital Status		
Married	1.00	Referent
Divorced	1.92	.30-12.29
Widowed	0.94	0.13-6.69
Separated	0.18	0.01-3.44
Never Married	1.35	0.07-28.23
Member of unmarried couple	0.55	0.08-3.67
Race		
White	1.00	Referent
Black	1.22	0.44-3.40
Other	1.24	0.36-4.36
Education		
Less than High School Graduate	1.00	Referent
High School Graduate/GED	3.98	0.63-25.10
Some College	7.09	1.86-27.09*
College Graduate	2.10	0.77-5.74
Income		
<$15,000	1.00	Referent
$15,000 to <$25,000	7.52	0.54-105.59
$25,000 to <$35,000	1.48	0.39-5.68
$35,000 to <$50,000	2.44	0.56-10.68
$50,000+	1.29	0.40-4.19
Payment Structure		
Salary	1.00	Referent
Hourly	1.13	0.17-7.70
Fee for service (e.g. task, commission)	0.92	0.14-5.98
Other	0.80	0.08-8.22
Home Ownership		
Own	1.00	Referent
Rent	2.82	0.97-8.22

* Indicates a p-value <0.01

Table 6. Results of stepwise logistic regression analysis of factors that are associated with fruit consumption

Variable	**Odds Ratio**	**95% Confidence Interval**
Education		
Less than High School Graduate	1.00	Referent
High School Graduate/GED	4.21	0.88-20.05
Some College	5.16	1.80-14.82*
College Graduate	1.96	0.87-4.46

* Indicates a p-value < 0.01

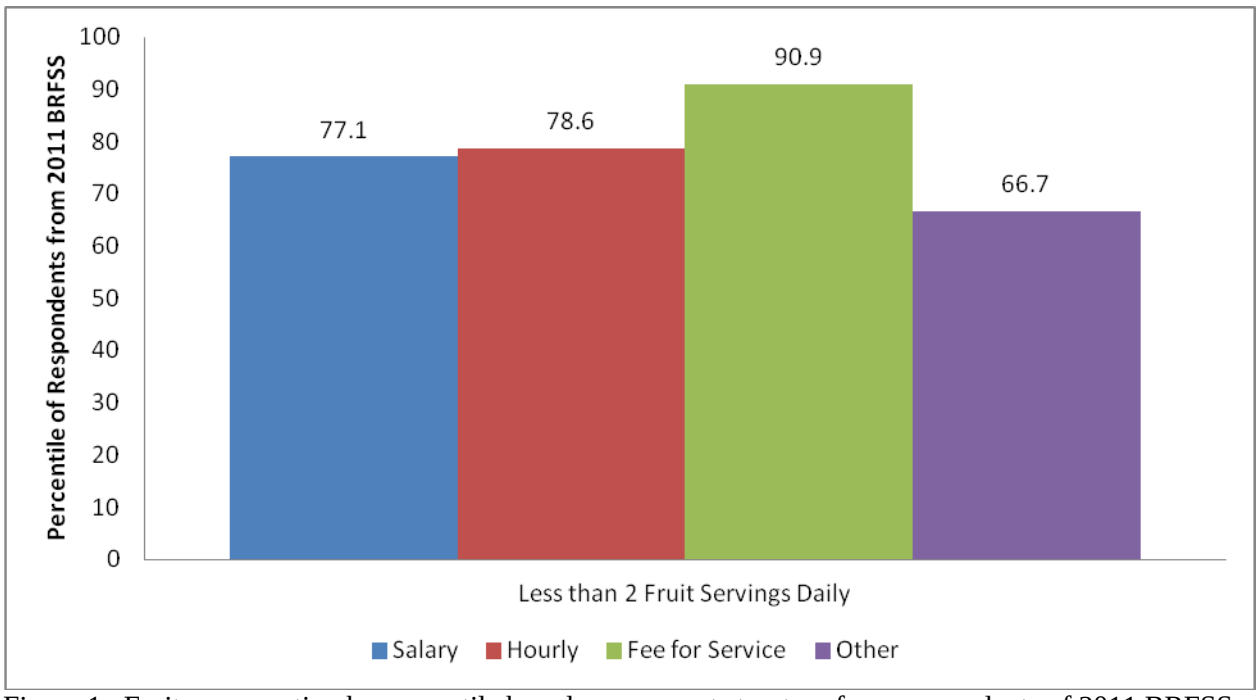

Figure 1. Fruit consumption by percentile based on payment structure from respondents of 2011 BRFSS
*All values in Figure 1 had a p-value <0.01

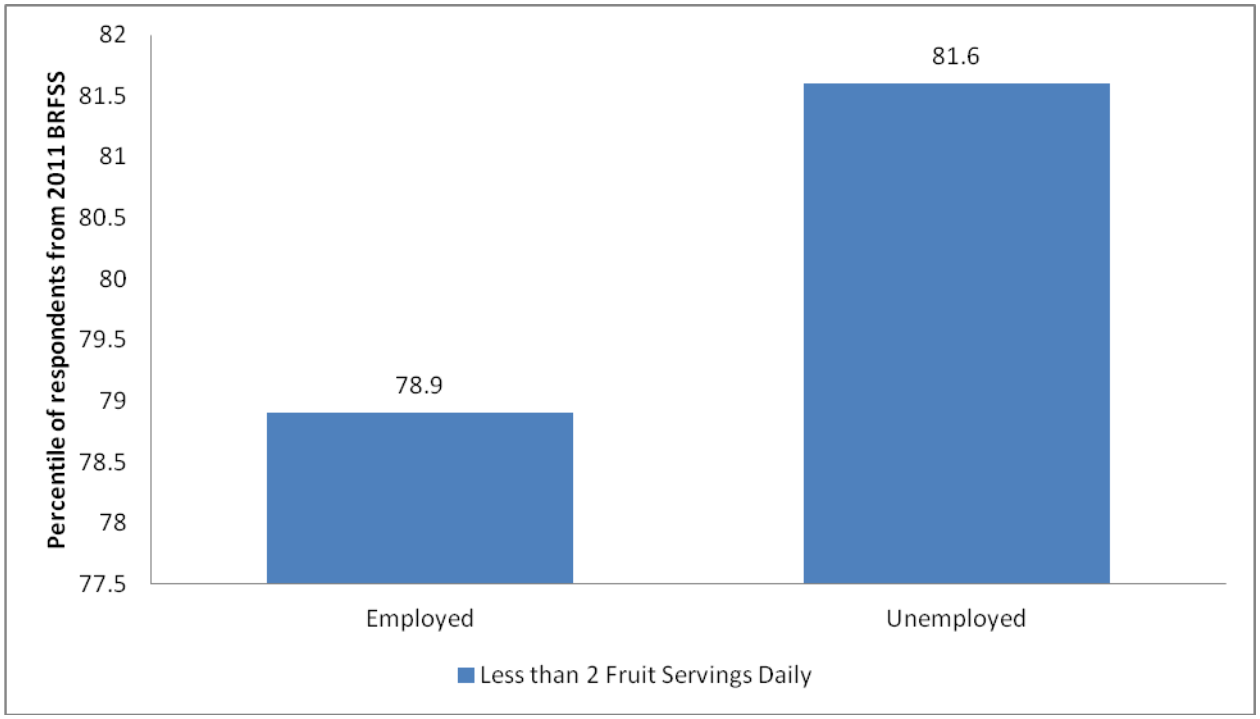

Figure 2. Fruit consumption by percentile based on employment status from respondents of 2011 BRFSS
*All values from Figure 2 had a p-value <0.01