

THE MONETARY IMPACT OF GROCERY TAX IN ALABAMA  
ON FRUIT AND VEGETABLE PURCHASES  
IN A VARIETY OF DEMOGRAPHICS

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## ABSTRACT

Fruits and vegetables are important to a healthy diet, decreasing risk for chronic disease and reducing obesity. However, consumption of fruits and vegetables is low nationally and in Alabama. A commonly listed barrier to adequate consumption is high cost of these items. In addition to cost, the \$0.04 Alabama sales tax increases cost of these items for individuals and households.

To determine financial impact of taxes, prices for popular fruit and vegetable items were gathered from 43 retail outlets in the highest and lowest poverty counties of 11 Alabama public health regions. Average prices were computed for items and an average was calculated for all fruits (\$0.69) and vegetables (\$0.68). This data was used to calculate cost and tax cost for individuals in all age-gender groups established by the United States Department of Agriculture (USDA) to consume adequate servings of fruits and vegetables annually, which varied for by group. This was combined with 2010 US Census for Alabama data to estimate the possible \$215,494,732.16 that could be generated if each Alabama citizen purchased adequate amounts of fruits and vegetables annually. The possible fruit or vegetable servings each individual could consume with the amount of money they pay in tax for these goods were also determined.

For individuals and households, especially low-income individuals and households, these additional tax costs could serve as a barrier to adequate consumption. Alabama could be the first state to implement a targeted tax reduction to examine the impact of price reduction on fruit and vegetable consumption.

## DEDICATION

This thesis is dedicated to those who helped and supported me through the process of creating this manuscript, my family, fellow graduate students, and faculty mentors. It is also dedicated to the practitioners who work tirelessly in Alabama to improve the lives and health of all citizens.

## LIST OF ABBREVIATIONS AND SYMBOLS

<i>BMI</i>	Body mass index
<i>BRFSS</i>	Behavioral Risk Factor Surveillance System
<i>F/V</i>	Fruits and vegetables
<i>NHANES</i>	National Health and Nutrition Examination Survey
<i>USDA</i>	United States Department of Agriculture
>	Greater than

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## CHAPTER 1: INTRODUCTION

Adequate consumption of fruits and vegetables (F/V) is an important part of a healthy diet. Studies have shown that diets high in F/V may prevent many chronic diseases (1-5). In a recent systematic review of studies, Ledoux et al (6) found that increased F/V consumption, in addition to other healthy lifestyle modifications, contributed to a lower rate of adiposity in adults. For these reasons, Americans are encouraged to consume two cups of fruit and two and a half cups of vegetables a day for optimal health (7-9). However, most Americans do not consume the recommended number of servings of F/V each day (10). From 2002-2009, less than 30% of Americans ate three or more vegetable servings and less than 35% ate at least two servings of fruit a day. Specifically, less than 30% of Alabama residents consumed fruit two or more times per day and vegetables three or more times per day (10). Although the benefits of F/V consumption are well known, there remains a gap between knowledge and action (11).

Perceived barriers to F/V consumption include high cost, lack of time, lack of access, and some cultural-specific barriers (11). Low socioeconomic status (SES) has also been associated with lower intakes of F/V, whereas households with higher incomes have been shown to have higher daily intakes of F/V (12). In a recent study profiling the nutrient content of different foods and food groups, researchers demonstrated an inverse relationship between energy density, the amount of calories in a specific volume of food, and food cost, indicating that foods with lower energy density such as F/V are more expensive than higher energy dense foods (13). Nutrient dense, moderate energy diets were also found to be more expensive overall than diets with less

nutritional value (14). This inverse relationship can create circumstances in which lower income individuals and families are unable to, or perceive themselves as being unable to, purchase adequate amounts of F/V.

In addition to the perception of high cost and cost per calorie of F/V, the additional 4% (15) sales tax levied on groceries and other goods in Alabama can increase barriers to fruit and vegetable consumption. Engel's Law states that as income decreases a higher portion of income is spent on food. In developed countries, diet quality has been shown to decrease as income decreases (16). These disparities exist in spite of understood benefits of adequate F/V consumption (11). The presence of financial disparity related to food access and intake patterns of F/V suggests that education programs and encouragement alone may not be enough to increase consumption among low-income households. Incentivizing consumption by making F/V easier to purchase may offer a new approach to increase fruit and vegetable consumption in Alabama.

To understand the costs associated with this tax, the researcher computed the additional costs associated with consuming the recommended servings of F/V based on the current tax structure in Alabama, where a 4% (15) tax is applied to groceries as well as other goods. The researcher also demonstrated that the money spent on taxes could be used to pay for additional servings of F/V.

## CHAPTER 2: REVIEW OF CURRENT LITTERATURE

### **Introduction**

Available research has shown that most Americans do not consume adequate servings of F/V, especially lower income individuals. Cost is one potential barrier. This chapter will explore current research on the health benefits of F/V, intake goals, and gaps in intake of F/V at different income levels. This chapter will also discuss the disparities in obesity and chronic disease rates based on income. Finally, this chapter will examine current recommendations for eliminating these disparities, the success of incentive programs aimed at increasing F/V intake, and proposed changes in tax systems targeted at health promotion in this area.

### **Health benefits of fruit and vegetable consumption:**

Fruits and vegetables (F/V) are good sources of fiber, vitamins, minerals and antioxidants in the diet and are important to overall health. They are also nutrient dense and have low energy density, meaning that they have a high content of desirable micronutrients per volume and provide a significant amount of these nutrients at a relatively low calorie level. The *Dietary Guidelines for Americans, 2010* suggests that Americans consume at least two cups of fruits and two and one half cups of vegetables daily when consuming a 2000 calorie diet (7). Fruit and vegetable intake is inversely related to risk of heart disease, type II diabetes, stroke, various cancers, and hypertension. (1-5, 17). A recent meta-analysis of 23 studies showed that as servings of F/V increase in combination with altered behaviors, rates of adiposity decrease and weight gain is slower in adults (6). These studies suggest that increasing consumption of F/V

can help control weight in adults, but offer no suggestions for increasing consumption of F/V in low SES populations.

### **Obesity rates and costs**

Approximately one third of American adults are currently obese, meaning they have a body mass index (weight in kg/height in m<sup>2</sup>) (BMI) of 30 kg/m<sup>2</sup> or more, placing them in a weight range that is above the level considered healthy. Furthermore, 17% of US children and adolescents are categorized as obese, indicating that their BMI for age is in the 95<sup>th</sup> percentile or above when compared to individuals of the same age and gender (18). At 32.2%, Alabama has one of the highest rates of adult obesity in the nation (18). Low socioeconomic status (SES) and minority status are both positive indicators of risk for obesity regardless of age (19).

In 2009, Finklestein et al (20) estimated that the national medical costs of obesity alone could have risen to \$147 billion annually. In addition to the monetary cost of obesity, the cost to individual and public health are staggering. Obesity has been associated with chronic diseases such as diabetes, hypertension, stroke, and chronic heart disease (1-5, 17). Decreasing the obesity rate in the US could be a step toward decreasing health care expenditures and lowering rates of chronic certain diseases.

### **Obesity and F/V intake among low income-households**

Food insecurity may be defined as limited or uncertain ability to find safe and adequate food in a socially acceptable manner and has been linked to high levels of obesity in adults, especially in women (21). Several theories exist explaining the paradoxical relationship between obesity and low SES and food insecurity. Some researchers have found that inconsistent eating patterns in children living in food insecure households can lead to increased adiposity as adults (22). Another explanation cites the issue of relative food cost. Energy dense foods such as soda

and snack items cost less than more nutrient dense foods such as F/V. This disparity can contribute to a low quality diet in food insecure households (13, 22-24). In a study of the relationship between poverty and obesity, Drewnowski et al (24) concluded that lower overall diet costs are associated with higher energy dense diets. Townsend et al (14) also found that high quality diets were more expensive than high fat, high energy, nutrient-poor diets.

Alternately, researchers have stated a positive association between income and F/V consumption. Using NHANES data, Dubowitz et al (12) found that higher neighborhood SES was positively associated F/V intake. Compared to the high-income group, defined as households with income greater than four times the federal poverty level (FPL), individuals living at 2-4 times, 1-2 times, and below the FPL ate 0.31, 0.41, and 0.62 fewer servings of F/V a day, respectively. They also found that income appears to be a more compelling factor in F/V consumption than employment status or ethnic background (12).

### **Disparity of Chronic Disease**

Food insecurity in low-income households has been linked with higher than average rates of chronic diseases. Self-reported food insecurity has been linked to high rates of hypertension, hypoglycemia, and poor diabetes self-management (25, 26). Adolescents have reported higher rates of risk-taking behaviors that may lead to chronic disease such as smoking, drinking, low F/V intake, and physical inactivity as household income and parental education decreases (27).

### **Dietary Guidelines and Recommendations of F/V servings**

Adherence to the food group recommendations within the USDA Food Guide and the *Dietary Guidelines for Americans, 2010* would produce an overall diet that is adequate in most essential nutrients but moderate in total fat, saturated fat, and sodium (28). Recommendations for fruit and vegetable intake are based on the average caloric needs, which are age- and gender-

specific and adjusted for physical activity levels (see Table 1 below). When individuals consume the recommended number of servings of F/V, they can increase the amount of needed nutrients in the diet including potassium, dietary fiber, folate, and vitamins A, C, E, and K (8, 9). In conjunction with recommendations for overall consumption of F/V, the United States Department of Agriculture (USDA) also recommends that individuals consume vegetable subgroups such as dark green and orange vegetables in specific amounts to meet certain nutrient recommendations (28). These can be consumed in fresh, frozen, or canned forms to receive the benefit (29). Recommendations for calorie levels and F/V servings are outlined in Table 1.1

**Table 2.1:**

*Daily recommended intake of fruits and vegetables for ages and genders at moderate physical activity levels based on the Dietary Guidelines for Americans, 2010 and the ChooseMyPlate Food Intake Patterns (7, 28)*

Males				Females			
Age (Years)	Calorie	Fruit (cups)	Vegetable (cups)	Age (Years)	Calorie	Fruit (cups)	Vegetable (cups)
2	1000	1	1	2	1000	1	1
3-5	1400	1.5	1.5	3	1200	1	1.5
6-8	1600	1.5	2	4-6	1400	1.5	1.5
9-10	1800	1.5	2.5	7-9	1600	1.5	2
11	2000	2	2.5	10-11	1800	1.5	2.5
12-13	2200	2	3	12-18	2000	2	2.5
14	2400	2	3	19-25	2200	2	3
15	2600	2	3.5	26-50	2000	2	2.5
16-25	2800	2.5	3.5	>51	1800	1.5	2.5
26-45	2600	2	3.5				
46-65	2400	2	3				
>66	2200	2	3				

### **Current Intake Patterns, Recommendations, and Perceived Barriers**

In spite of current guidelines, consumption of F/V among adults and children do not meet recommendations. Current data from the Centers for Disease Control and Prevention (10) show

that in 2009, only 32.5% of Americans and 24.6% of Alabama residents consumed fruit two or more times a day and only 26.3% of Americans and 26.9% of Alabama residents consumed vegetables three or more times per day (10). These estimates are not only lower than the recommendations set out in the *Dietary Guidelines for Americans, 2010* but also fell short of meeting Healthy People 2010 objectives (28, 30).

The newly released Healthy People 2020 (HP2020) (30) objectives include increasing the amount of F/V consumed by Americans over the age of 2 years (30). Baseline intake of fruits, according to HP2020, was 0.5 cups per 1,000 calories of daily intake and the goal has been set to increase this amount to 0.9 cups per 1000 calories. For vegetables, the baseline is 0.8 cups per 1,000 calories and the new goal is set for 1.1 cups per 1,000 calories. In addition to these objectives, HP2020 materials and the *Dietary Guidelines for Americans, 2010* recommend consumption of dark green and orange vegetables, F/V consumption as part of meals and snacks, and F/V consumption in place of other energy dense foods for weight management (30).

### **Costs of F/V**

Increasing F/V intake has been a goal for researchers, healthcare professionals and policy makers for years. Programs to increase consumption have included education, subsidies, and increasing access to F/V. In a study of 147 adults of multiple ethnicities, researchers found that whereas most participants were aware of the benefits of F/V consumption and current recommendations, adherence to those recommendations was not observed (11). Yeh et al (11) found that the most commonly cited barrier to F/V consumption was high cost. Other barriers were lack of time to prepare or shop for F/V, lack of access to F/V, and other specific ethnically related barriers. The strongest catalyst to increased F/V consumption was reported knowledge of F/V benefits (11).

With cost appearing to be one of the most universally reported barriers to F/V consumption, researchers have extensively studied the cost of and socioeconomic issues related to purchasing F/V. In a 2004 report, Reed et al (31) found that Americans could consume three servings of fruit and four servings of vegetables a day for 64 cents. This included fresh, frozen, canned and alternative versions of specific F/V items chosen based on popularity. Stewart et al (32) reported that in 2008, the average cost of consuming two cups of fruit and two and a half cups of vegetables a day rose to \$2.50 per person, indicating a dramatic rise in the cost of adequate fruit and vegetable consumption at the individual level.

Drewnowski (33) calculated the relative energy costs, or cost per calorie, of foods, finding that energy costs for F/V were higher than any other food group and concluded that lower cost foods were more energy dense and had a lower nutrient content than more expensive foods such as F/V. These data reveal one of the possible underlying causes for higher obesity rates and lower F/V consumption among lower SES households; higher costs hinder households' abilities to consume higher quality, low energy dense diets rich in F/V.

However, purchasing power for groceries, or the amount of money a household has to spend on a particular good, seems to have little affect on the amount of money allocated to F/V purchases. In 2007, only 12 cents of each dollar spent on food was spent on F/V (34). This falls behind purchases of miscellaneous foods including processed and prepackaged meals, behind meat and poultry, and behind food away from home. In these households, as income or purchasing power increased from a household income level of \$10,000-\$14,999 to over \$70,000 the amount of money spent monthly on F/V increased from \$50 to \$76 (34). Furthermore, researchers have found that when income increased by small amounts for lower income



Americans, extra money was not spent on increased F/V, but was spent on other staple items such as clothes and rent (34).

### **Price and Income Elasticity of Demand for Fruits and Vegetables**

Price elasticity of demand measures the responsiveness of the demand for a good relative to changes in price of that good. This measure is useful in estimating and evaluating consumer responsiveness to price changes by dividing the percent change in quantity demanded by the percent change in the price. For most items, this indicator is a negative number, meaning that demand increases as prices decrease (or demand decreases as prices increase). Similarly, income elasticity of demand measures consumer responsiveness to changes in income for a particular good of interest. These numerical values are most often used as absolute values, and will be in the remainder of this review.

Previous research suggests that fruits and vegetables display relatively low price elasticity of demand (0.7 and 0.58 respectively), or are own-price inelastic. This indicates low responsiveness on the part of consumers, as small decrease in the price of these items may not necessarily result in greater purchases. Studies have demonstrated that based on price elasticity for fruits and vegetables, larger decreases in price will increase the consumption of these items at a higher rate than do smaller decreases in price, particularly for low income households (34, 35). Studies examining income elasticity found that as income increased, the purchases of fruit and vegetable goods increased at a less than proportional rate, which is indicative of a normal, or income inelastic good. That is, consumer response to income changes in terms of fruit and vegetable purchases is not as dramatic as other items including food away from home and meat products (34).

Although simple price reductions for fruits and vegetables may not have a significant influence on purchase behavior based on the price elasticity of demand, several studies have demonstrated that targeted reductions in price have increased consumption in various populations (12, 35-38). As an alternative to price decreases through the elimination of tax on these goods, subsidy programs could provide incentives that have been demonstrated as effective in increasing fruit and vegetable consumption in this population.

### **Incentivized Programs to Increase Consumption**

Because of high costs compared to other foods, and evidence that cost is the most commonly reported reason for low F/V intake, some researchers have proposed that education alone may not be enough to increase F/V consumption. Federal programs offering incentives to targeted groups with reportedly low F/V intake have been successful at improving participant intake. Research has found that these programs have improved F/V intake in low-income households (12, 36-39).

One such program is the Seattle Seniors Farmer's Market Program that offered convenient, less costly, or free access to fresh F/V and significantly increased consumption (37). In the study, seniors receiving deliveries of farmer's market baskets bi-weekly containing fresh F/V consumed 1.31 more servings of F/V each day than did older adults in the control group who did not receive fresh F/V delivery.

Other successful programs have examined the influence of targeted vouchers or subsidies on F/V consumption. Herman et al (38) reported that when provided with subsidies in the form of vouchers specific for F/V, women participating in the Women, Infants, and Children (WIC) Supplemental Nutrition Program significantly increased their F/V consumption and maintained that increase for a period of six months after the subsidies ended. Participants in the WIC

program live between 100-185% of the FPG, an income level in which Dubowitz et al (12) reported individuals consume 0.41 less servings of F/V per day than individuals with high income. Participants who received vouchers to purchase F/V from farmer's markets increased their consumption by 1.4 servings per 1,000 calories and women who used vouchers specifically at supermarkets consumed an additional 0.8 servings of F/V per 1,000 calories (38).

Along with free access and voucher programs, price reduction interventions may increase consumption of F/V. In a review of price interventions, French (39) concluded that 50% price reductions on baby carrots and fresh fruits in school cafeterias resulted in a sales increase for both fruits (by four times as much) and baby carrots (by two times). The success of these programs, like similar USDA programs, illustrates that changes such as price decreases, availability of vouchers, and subsidies can have a profound effect on consumption of F/V when they are food group specific. Decreasing or eliminating taxes on F/V could serve as an initial financial incentive by providing easier financial access to these goods.

### **Tax Policy and Food Purchasing**

As of 2009, Alabama and Mississippi were the only remaining states taxing groceries at the same rate as all other goods (15, 40). Along with state sales tax on groceries, separate county taxes can also be levied on groceries, further increasing the price. Engle's Law states that as income rises, the portion of household income spent on food decreases. Thus, Alabama tax code is regressive, meaning that this tax requires lower income households to pay a larger portion of their income than higher income households.

Some policy makers and healthcare advocates have endorsed sin taxes to deter less desirable or unhealthy behavior. In affect, these taxes would alter the cost (in this case increasing) of more energy dense foods such as sugar-sweetened beverages to deter unhealthy

behavior. Studies on this topic have demonstrated that price increases on certain foods can decrease consumption and subsequently decrease energy intake from these goods, although direct tax programs are still controversial (41, 42). The implementation of taxes on sodas, pizza, and other excessively energy dense and nutrient poor foods, however, can be only one part of the picture. Increasing cost of these energy dense foods could possibly act as a deterrent, or could serve to increase revenue for education programs, but may not make healthier diets more affordable. As long as the current tax structure in Alabama is regressive, increasing the cost of more energy-dense foods would not act as an incentive to purchase healthier alternatives.

Research into this area has yet to show significant relationships between direct tax increases and obesity rates. Powell et al (43) found that in an observational study of 153,673 adolescents, there was no significant relationship between BMI across states with soda tax as compared to states without soda tax. These researchers point out that soda taxes, unless they are increased significantly, may be more useful as a revenue generator and less as a deterrent to purchases of sugar-sweetened beverages. The taxes examined in this study did not significantly reduce the consumption of these goods and showed no promise at encouraging the consumption of healthier alternatives during the time period of this study.

Similar results have been reported in studies of younger populations as well. Using individual state data on sales tax and information from the Early Childhood Longitudinal Study-Kindergarten Cohort, Strum et al (44) determined that current taxes on sodas are too small to act as a deterrent. They suggest that the greater impact of such taxes would be realized if revenue were used to create obesity prevention programs.

In general, these sin taxes have very little impact on individual consumption decisions, but the total revenue generated is substantial. The amount of money generated by small taxes on

goods such as sugar-sweetened beverages, gum, candy, and snack foods may not be enough to affect individual choice, but is a substantial amount in total. Jacobson et al (42) identified approximately \$1 billion nationally being raised from sin taxes on these goods in 2000. The money from these taxes was used to fund a variety of programs in different states including Medicaid, environmental management, and funding for medical, dental or nursing schools. Jacobson et al (42) contend that this money could be used to fund health promotion and education programs. However, they noted that many states were enticed to repeal such legislation due to lobbying on the part of manufacturers of the taxable products (42).

Brownell et al (45) have taken a similar position on sin taxes and suggested that a tax on sugar-sweetened beverages could decrease consumption and could increase tax revenue generated to prevent obesity. By taxing sweetened beverages based on amounts of added sugar, Brownell et al (45) contend that taxation could act as an incentive to reduce the amount of sugar used by beverage manufacturers. Although this system would add incentives for manufacturers of such goods to decrease sugar in beverages, it offers little incentive to individual consumers to change behavior as costs are passed on to consumers.

The implementation of sin taxes, such as those suggested on energy-dense foods, has been tested on other goods like cigarettes. Although these taxes have been effective in reducing smoking among some groups, the tax is a higher burden on low-income subgroups where cigarette smoking, like high intake of energy dense food, is concentrated (46). Current research shows little promise of these taxes decreasing consumption of energy dense foods and studies have shown that when sin taxes are enacted close to a state border residents will often cross the border into neighboring states or territories where the sin tax is not applied (47).

Similar outcomes have been noted with standard grocery taxes as well. In a study evaluating grocery tax in West Virginia from 1988-1991, researchers determined that for each one percent increase in grocery tax, sales of groceries fell by 1.38%. Researchers estimated that customers living in counties on the state border were crossing into neighboring states without grocery taxes to purchase foods. As a result, food sales in West Virginia fell by six percent in 1990 (48).

### **Call for research**

Current research in the area of food taxation focuses on the imposition of sin taxes on items such as sugar-sweetened beverages, snacks, and candy. Research in this area has been effective in showing that small increases in taxes made in states have been successful at generating revenue but have failed to significantly reduce consumption of undesirable goods, and more importantly have failed to decrease BMI in target populations. These tax increases are also subject to negative lobbying by manufacturers of taxable goods. These policies also fail to account for lack of individual choice when purchasing foods by making high-energy dense foods less affordable, and by disregarding current costs of healthier options. This pricing problem is magnified in Alabama, where any additional “sin” taxes are applied to grocery purchases that are already taxed at a premium.

As educators and policy makers strive to find solutions to the growing problem of obesity, it is important to examine a variety of interventions. Sin taxes have been effective in reducing smoking, just as incentive programs have proven effective at increasing F/V consumption by increasing access to these goods. Therefore, it is important to ask if reducing the tax burden on F/V in Alabama could be a step toward increasing consumption, controlling weight, and helping to reduce chronic disease risk. However, in order to reduce the tax burden

advocacy groups must understand the amount of revenue generated by this change and potential consequences.

Policy makers and groups have tried numerous times to reduce or eliminate sales tax on groceries but these efforts have met opposition and have been without success. The opposition has centered around the loss of revenue from grocery taxes, because people will always purchase food goods, no matter the state of the economy. However, a targeted repeal, much like an incentive program, could increase consumption of F/V by decreasing the financial burden on individuals while offering only a small decrease in state revenue.

### **Statement of Purpose**

The purpose of this research was to determine the tax cost of meeting the USDA recommended intake of F/V for all demographics in the state of Alabama in order to determine if tax cost on these goods could be prohibitive to consuming adequate servings.

## CHAPTER 3: METHODS

This study used current price data collected across the state of Alabama to determine the amount of sales tax each resident in Alabama would pay if they were to consume the recommended servings of F/V daily. This chapter describes in detail the proposed methodology used including the research questions, stratification and sampling of grocery chains, development of a data collection tool and data collection methods, anticipated outcomes, and a timeline for the research.

### **Research Questions**

The proposed research questions examined the financial impact of fruit and vegetable consumption on a variety of demographics. Researchers identified the average cost of F/V from a variety of sources, used that information to calculate an average cost per serving for both F/V, and finally assessed the tax burden based on the Alabama 4% tax applied to groceries. The research aimed to answer the following questions:

1. What is the estimated average cost per serving of fruits and vegetables, as based on the USDA recommendations for serving size and the Child Nutrition Program Guide to edible portions in the state of Alabama?
2. If an individual resident in Alabama in each demographic group were to eat the recommended number of servings of fruits and vegetables, how much sales tax would they pay annually?
3. If each resident of Alabama were to eat the recommended number of servings of fruits and vegetables daily for one year, how much tax revenue would it produce?



4. Could the amount of tax spent on fruits and vegetables cover the cost of purchasing an additional daily serving of fruit and/or vegetable?

**Sample selection of target regions and grocery chains:**

The cost of F/V may differ across the state. Research has suggested that costs of these items may be higher in rural communities than suburban areas (22). Costs of these items may be especially high in urban food deserts, areas where healthy and affordable food options are difficult to locate (49). Costs also may vary based on whether the produce is purchased in a chain grocery store or discount outlet store, such as Target or Wal-Mart. For this project, costs of F/V were obtained through a sample of outlets, both chain grocery and discount outlet, throughout Alabama. To ensure sampling in all regions of the state, the researcher selected at least one discount outlet and one chain grocery store within the 11 public health regions designated by the Alabama Department of Public Health (see Table 3.1, below). Within the 11 regions, the researcher identified the county with the highest level of poverty and the lowest level of poverty. Discount grocery chains, defined as grocery chains with food quantities at discount prices and no membership fee such as Super Wal-Mart or Super Target, were identified within each of the selected counties. For each county, a discount center was chosen at random. For the two public health regions comprised of a single, highly populated county (Jefferson and Mobile), two discount chains were chosen at random. For consistency, the non-discount grocery store chosen for all counties was defined as the grocery store chain in closest proximity to the randomly selected discount chain. Lists of discount outlets were obtained from the Wal-Mart and Target corporate offices, and locations for the closest non-discount chain grocery stores were obtained from the chamber of commerce for the chosen city or region.

**Table 3.1:***Poverty rates for each county in Alabama divided by Public Health Region*

<b>Public Health Region 1</b>	<b>Poverty level per county (%)</b>
Lauderdale	14.5
Colbert	16
Walker	16
Marion	21.2
Franklin	21.8
Winston	24.9
<b>Public Health Region 2</b>	
Madison	10.3
Limestone	13.5
Morgan	15.9
Lawrence	16.2
Jackson	16.4
Marshall	19.1
Cullman	19.3
<b>Public Health Region 3</b>	
Bibb	18.1
Lamar	18.2
Fayette	19.6
Tuscaloosa	19.9
Pickens	28
Greene	28.4
<b>Public Health Region 4</b>	
Jefferson	16.5
<b>Public Health Region 5</b>	
Shelby	6.9
St. Clair	13.8
Blount	14.6
Etowah	17.2
Cherokee	18.4
Dekalb	21.7
<b>Public Health Region 6</b>	
Coosa	16.7
Cleburne	17
Tallapoosa	17.8
Talladega	18.9
Calhoun	19
Clay	19.2
Chambers	20.7
Randolph	21.1

**Table 3.1:***Poverty rates for each county in Alabama divided into 11 Public Health Regions continued.*

<b>Public Health Region 7</b>	
Choctaw	22.8
Marengo	24.9
Hale	26.6
Perry	31
Wilcox	34.6
Dallas	35
Sumter	35.1
<b>Public Health Region 8</b>	
Autauga	11.2
Elmore	14.2
Chilton	18.7
Montgomery	19.9
Russell	19.9
Lee	20.7
Bullock	34.7
Macon	38.6
<b>Public Health Region 9</b>	
Baldwin	13.3
Washington	19.3
Escambia	22
Covington	22.5
Monroe	23.4
Conecuh	27.5
Clarke	29.1
Butler	29.4
<b>Public Health Region 10</b>	
Coffee	15.7
Dale	16.2
Houston	17.7
Henry	18.7
Geneva	19.4
Crenshaw	20.6
Pike	27.6
Barbour	32.8
<b>Public Health Region 11</b>	
Mobile	18.7

Source. Counties in Alabama divide into 11 Public Health Regions according to the Alabama Department of Public Health. Poverty rates are based on information from the Alabama Poverty Project (50).

## **Tool Development and Measures**

An appropriate tool to collect price information for fruit and vegetable items should be both broad to encompass an adequate variety of F/V in edible forms, but also applicable to regional tastes. Using data from the USDA Economic Research Service's data sets on food availability, the researcher selected the most popular F/V consumed by Americans (51). From this data, the 10 fruits and 10 vegetables with the highest disappearance rates were chosen and processed versions of these foods were selected as well as—canned, frozen, or juice—made from the original version. In addition, some regionally popular food items were added to the list because the study deals directly with the state of Alabama.

Prices for fresh fruit and vegetable items were recorded onto the Fruit/Vegetable Price Audit Form (see Appendix). Prices for fresh produce were recorded by pound with the exception of whole items, such as watermelons or pineapples, which were reported as price per whole item. For canned and frozen items, a representative brand was chosen and a specific size container was chosen to establish a standard serving size and price. All of this information was included on the data collection tool with specific instructions for the data collector.

Each tool contains a cover sheet with the name and address of two stores, one discount center and one grocery chain selected as described above. In addition there is a cover sheet that was filled out by each surveyor with contact information and information about the date that their data were collected.

## **Data Collection**

The Alabama Obesity Task Force is an advocacy group whose members live in almost every county across the state. Members were recruited at the August 17<sup>th</sup> general meeting to assist with this study by completing the Fruit/Vegetable Price Audit Form. This group agreed to

help the researcher with this project and use the result of this study for their advocacy efforts. Data were collected between August 11<sup>h</sup>, 2011 and September 1<sup>st</sup>, 2011 as specified on the Fruit/Vegetable Price Audit Form. After collection, the tools were placed in an addressed, stamped envelope provided by the researcher and mailed back for data entry.

### **Data Entry and Computation:**

Price data were entered into Microsoft Excel and average prices for each item were determined. Once an average price per item was determined, the researcher used the Food Buying Guide for Child Nutrition Programs and the *Dietary Guidelines for Americans, 2010* to determine the servings per edible portion of fresh F/V. For example, apples, purchased fresh by the pound yield 3.7 one-cup equivalent servings (52). For processed items, servings per purchased container were determined using data from the USDA *Dietary Guidelines for Americans, 2010* (7). For example, one serving of frozen broccoli would be one cup of frozen, cooked broccoli florets without sauce.

To determine an overall average in season price per serving of fruit, the cost per serving of all fruits (fresh, canned and frozen) was averaged. The same procedure was used for vegetables. These estimates were used in further calculations and provide the answer to research question one.

To answer question two, the number of recommended servings per day for an individual in each demographic group was multiplied by the average cost per serving of fruits and cost per serving of vegetables to determine the daily cost. This daily cost was multiplied by the standard 4% state sales tax applied to fruits and vegetables in Alabama. This calculation was repeated for each demographic group to determine cost for all residents.

To answer research question three, 2010 census data was used to determine the number of individuals living in Alabama within each age and gender group represented in Table 1. The number of individuals within each group was multiplied by the number of fruit servings recommended for the group based on the USDA Food Guide (Table 2.1). Once the total amount of fruit that should be consumed by the population was determined, this number was multiplied by the average cost for a fruit serving in Alabama. Lastly, this number was multiplied by the state sales tax rate of 4%. This procedure was repeated for the vegetable group and the tax revenue was added in total.

Lastly, to answer research question four, the amount of tax needed to purchase the adequate number of F/V servings calculated in question two was divided by the average price per serving of fruits and price per serving of vegetables. This calculation was performed for all age and genders included in Table 1. This amount will determine how many servings of fruit and/or vegetable could be consumed with the money currently spent on grocery tax for these items.

### **Anticipated Outcomes, Problems, and Limitations**

The researcher anticipated that after data are collected and analyzed, prices for F/V in Alabama will appear similar to the national average for F/V as reported by the USDA. The researcher also anticipated that the cost of tax on adequate servings of fresh fruit and vegetables will be enough to cover the cost of at least one extra serving of a fruit and/or vegetable each week for almost all age and sex groups in Table 2.1. However, this study does have certain limitations.

One limitation would be the fluctuating cost of F/V during growing seasons. Because some goods are grown during the summer in larger quantities, their cost may be lower during the

time period when data collection is scheduled. Conversely, some goods such as winter greens, may be more expensive during the summer months when they are not at the height of their growing season. These inconsistent cost patterns could mean that the actual year-round price of goods is different from the data collected during late summer. Thus, the tax estimate may be lower than the actual year-round amount.

Some goods included in this study were chosen on a brand basis for consistency throughout data collection. Although this will add to the consistency of outcomes between retail outlets, it will not take into account price differences between premium and store brands and the possibility that lower or higher prices may be more common in retail outlets. This, as well, could mean that the actual cost of goods is either higher or lower on average than anticipated based on data collection. However, all regions of the state will be represented in this research and each region has been further stratified into high- and low-income counties, with discount and retail grocery outlets to try and control for some of this variance.

### **Project Timeline**

**Table 3.2:**

*Project Timeline*

Date	Activity	Location
August 10, 2010	Thesis proposal	Proposal meeting with committee members Tuscaloosa, AL
August 17, 2010	Fruit/Vegetable Price Audit Form distribution	Alabama Obesity Taskforce meeting; Clanton AL
August 17-September 5, 2010	Data collection	11 public health regions across AL
September 5-10	Data assessment	N/A
September 10-15	Thesis project report	N/A
September 15	Report to advisor	N/A
September 15-26	Edits with advisor	N/A
September 26	Send Completed Thesis to committee	N/A
October 10	Thesis defense	Defense with committee members Tuscaloosa AL

## CHAPTER 4: RESULTS

This chapter will answer the four research questions posed in Chapter II. Questions were answered with data collected between August 10 and September 1, 2011 across the state of Alabama. The 2010 U.S. Census data was used to determine population estimates for various age-gender groups in Alabama (53). The results of this study are presented with corresponding tables that illustrate analysis and findings.

Counties surveyed represented the highest and lowest poverty level counties for each of the 11 public health regions designated by the Alabama Department of Public Health. For each county, a Wal-Mart or Target Supercenter was randomly selected to be surveyed as a discount grocery chain and the non-discount grocery chain in the closest physical proximity to that discount chain was selected. Wal-Mart was randomly selected 16 times. For counties with no discount chain present, two grocery stores were chosen at random in the city with the largest population. Goodwater, in Coosa County had only one grocery store. In total, 43 stores are represented in this sample.

### **Estimated Average Cost per Serving of Fruits and Vegetables in Alabama**

One main purpose of this study was to determine the average cost of fruit and vegetable one-cup equivalent serving specific to the state of Alabama. Using individual food item price averages, an average price for one-cup equivalents of fruits (\$0.69) and an average price for vegetables (\$0.68) were established specifically for the state of Alabama; averages were rounded



to the nearest cent. Average prices for individual food items and for one-cup equivalents of fruits and vegetables can be found in Table 4.1 and 4.2.

**Table 4.1:**

*Average price for one-cup equivalent serving of fruit in Alabama, 2011*

<b>Fruit</b>	<b>Average price per one-cup equivalent</b>
Orange, fresh	\$1.09
Banana, fresh	\$0.43
Grape, fresh	\$0.90
Peach, fresh	\$0.79
Pear, fresh	\$0.79
Pineapple, fresh	\$1.25
Apple, fresh	\$0.47
Strawberry, fresh	\$0.98
Watermelon, fresh	\$0.15
Cantaloupe, fresh	\$0.96
Frozen Orange Juice, reconstituted <sup>a</sup>	\$0.38
Fresh OJ <sup>a</sup>	\$0.41
Raisins <sup>b</sup>	\$0.43
<b>Average price for fruit one-cup equivalent</b>	<b>\$0.69</b>

<sup>a</sup> One cup 100% fruit juice=one cup fruit equivalent

<sup>b</sup> One half cup dried fruit=once cup fruit equivalent

Average cost was computed from data taken from a total of 43 grocery suppliers across the state of Alabama over a three-week period in August 2011. Prices were recorded on the Fruit and Vegetable Price Audit Form by members of the OTF and by the researcher. Average prices were computed for individual items using the Child Nutrition Program Food Buying Guide (52). Among fruits, watermelon was consistently the least expensive fruit to consume per one-cup equivalent, while oranges and pineapples were consistently more expensive. Among vegetables, fresh corn, jarred spaghetti sauce (tomatoes) and jarred salsa (tomatoes) were consistently more expensive products. Cabbage, romaine and iceberg lettuces were the least expensive vegetables to consume per one-cup equivalent. For both fruits and vegetables, the most inexpensive product to purchase was a fresh product, watermelon (\$0.15) and cabbage (\$0.15). Prices for fruit ranged

from \$0.15 for fresh watermelon to \$1.25 for fresh pineapple. Prices for vegetables ranged from \$0.15 for fresh cabbage to \$1.83 for salsa (tomato).

**Table 4.2:**

*Average price for one-cup equivalent serving of vegetable in Alabama, 2011*

<b>Vegetable</b>	<b>Average price per one-cup equivalent</b>
Cabbage, fresh	\$0.15
Carrots, fresh	\$0.41
Celery, fresh	\$0.52
Corn, fresh	\$1.15
Cucumbers, fresh	\$0.93
Iceberg Lettuce, fresh	\$0.26
Romaine Lettuce, fresh	\$0.26
White Onions, fresh	\$0.49
Baking Potatoes, fresh	\$0.66
Tomatoes, fresh	\$0.85
Collard Greens, fresh	\$0.74
Turnip Greens, fresh	\$0.73
Baked Beans, canned	\$0.67
Pinto Beans, canned	\$0.58
Corn, canned	\$0.72
Salsa, jarred	\$1.83
Green Beans, canned	\$0.65
Diced Tomatoes, canned	\$0.71
Spaghetti Sauce, jarred	\$0.99
Corn, frozen	\$0.51
Broccoli, frozen	\$0.34
French Fries, frozen	\$0.80
Average price for vegetable one-cup equivalent	<b>\$0.68</b>

### **Potential Tax on Adequate Fruit and Vegetable Purchases**

A primary purpose of this research was to determine the individual cost of eating fruits and vegetables. Using the data collected to answer Research Question 1 and the recommended servings of fruits and vegetables for each age-gender group from the MyPlate Food Intake Patterns (28), the researcher was able to determine the daily cost of consuming the recommended servings of fruits and vegetables for each specified demographic. Using this information, the researcher applied the \$0.04 general sales tax levied in Alabama per \$1.00 spent to calculate the daily tax cost, and then the yearly tax cost for an individual in each specified demographic.

Dollar amounts have been rounded to the nearest cent. Tables 4.3 and 4.4 display the daily cost, daily tax cost, and yearly tax cost for males and females.

**Table 4.3:**

*Daily cost, daily tax cost, and yearly tax cost of consuming the recommended servings of fruits and vegetables for male individuals in Alabama, 2011*

Age (years)	Fruit Servings	Cost of Fruit Servings	Vegetable Servings	Cost of Vegetable Servings	Total Daily Cost	Daily Tax Cost	Yearly Tax Cost
2	1	\$0.69	1	\$0.68	\$1.37	\$0.0548	\$20.00
3-5	1.5	\$1.04	1.5	\$1.02	\$2.06	\$0.0824	\$30.08
6-8	1.5	\$1.04	2	\$1.36	\$2.40	\$0.096	\$35.04
9-10	1.5	\$1.04	2.5	\$1.70	\$2.74	\$0.1096	\$40.00
11	2	\$1.38	2.5	\$1.70	\$3.08	\$0.1232	\$44.97
12-13	2	\$1.38	3	\$2.04	\$3.42	\$0.1368	\$49.93
14	2	\$1.38	3	\$2.04	\$3.42	\$0.1368	\$49.93
15	2	\$1.38	3.5	\$2.38	\$3.76	\$0.1504	\$54.90
16-25	2.5	\$1.73	3.5	\$2.38	\$4.11	\$0.1644	\$60.01
26-45	2	\$1.38	3.5	\$2.38	\$3.76	\$0.1504	\$54.90
46-65	2	\$1.38	3	\$2.04	\$3.42	\$0.1368	\$49.93
66+	2	\$1.38	3	\$2.04	\$3.42	\$0.1368	\$49.93

**Table 4.4:**

*Daily cost, daily tax cost, and yearly tax cost of consuming the recommended servings of fruits and vegetables for female individuals in Alabama*

Age (years)	Fruit Servings	Cost of Fruit Servings	Vegetable Servings	Cost of Vegetable Servings	Total Daily Cost	Daily Tax Cost	Yearly Tax Cost
2	1	\$0.69	1	\$0.68	\$1.37	\$0.05	\$20.00
3	1	\$0.69	1.5	\$1.02	\$1.71	\$0.07	\$24.97
4-6	1.5	\$1.04	1.5	\$1.02	\$2.06	\$0.08	\$30.08
7-9	1.5	\$1.04	2	\$1.36	\$2.40	\$0.10	\$35.04
10-11	1.5	\$1.04	2.5	\$1.70	\$2.74	\$0.11	\$40.00
12-18	2	\$1.38	2.5	\$1.70	\$3.08	\$0.12	\$44.97
19-25	2	\$1.38	3	\$2.04	\$3.42	\$0.14	\$49.93
26-50	2	\$1.38	2.5	\$1.70	\$3.08	\$0.12	\$44.97
51+	1.5	\$1.04	2.5	\$1.70	\$2.74	\$0.11	\$40.00

Daily cost of consuming fruits and vegetables differs between age and gender groups in accordance with differences in recommendations for consumption as set out by the USDA (31).

As age and recommended consumption increases, the total cost of consuming the recommended one-cup equivalents increases, which leads to an increase in the overall tax charged. Males between 16-25 years old face the highest cost to consume the recommended servings of fruits and vegetables daily (2.5 one-cup equivalents of fruit and 3.5 one-cup equivalents of vegetables). An individual in this group would pay an additional \$60.01 annually in Alabama sales tax to meet the USDA recommendations. It is least expensive for both males and females at age two to consume the recommended servings of fruits and vegetables daily (1 one-cup equivalent of fruit and 1 one-cup equivalent of vegetables). Parents would pay \$20.00 annually in tax to meet the USDA recommendations, in addition to the general cost of food items.

#### **Total Potential State Tax Revenue for Adequate Fruit and Vegetable Purchases**

Another goal of this research is to determine the amount of revenue generated by sales tax if each individual in Alabama were to eat the appropriate servings of fruits and vegetables in Alabama annually. The researcher obtained the number of Alabama citizens from each age-gender group from the 2010 US Census Bureau (53). To determine tax revenue, the amount of annual sales tax generated for an individual in each group consuming the recommended one-cup equivalent servings of fruits and vegetables (data from Research Question 2) was multiplied by the number of individuals in that demographic group. The annual sales tax generated for each group, both male and female, was added together to produce the final amount of projected tax revenue. The annual amount of revenue generated can be found in Table 4.5 and 4.6 below.

**Table 4.5:**

*Projected annual tax revenue generated if all males were to consume the recommended one-cup equivalent servings of fruits and vegetables daily*

Age (years)	Number of Individuals	Tax Cost Per Year	Population cost
2	31,607	\$20.00	\$632,140.00
3 to 5	93504	\$30.08	\$2,812,600.32
6 to 8	93199	\$35.04	\$3,265,692.96
9 to 10	66378	\$40.00	\$2,655,120.00
11	32413	\$44.97	\$1,457,612.61
12 to 13	65324	\$49.93	\$3,261,627.32
14	32545	\$49.93	\$1,624,971.85
15	33421	\$54.90	\$1,834,812.90
16 to 25	340617	\$60.01	\$20,440,426.17
26 to 45	606335	\$54.90	\$33,287,791.50
46 to 65	606391	\$49.93	\$30,277,102.63
>66	257402	\$49.93	\$12,852,081.86
Total			\$114,401,980.12

**Table 4.6**

*Projected annual tax revenue generated if all females were to consume the recommended one-cup equivalent servings of fruits and vegetables daily*

Age (years)	Number of Individuals	Tax Cost Per Year	Population cost
2	30,676	\$20.00	\$613,520.00
3	30271	\$24.97	\$755,866.87
4 to 6	89109	\$30.08	\$2,680,398.72
7 to 9	91689	\$35.04	\$3,212,782.56
10 to 11	63143	\$40.00	\$2,525,720.00
12 to 18	224634	\$44.97	\$10,101,790.98
19-25	236323	\$49.93	\$11,799,607.39
26-50	806516	\$44.97	\$36,269,024.52
>51	828351	\$40.00	\$33,134,040.00
Total			\$101,092,751.04

The projected yearly state sales tax revenue produced through the purchases of adequate servings of fruits and vegetables is \$215,494,732.16, and would be roughly 12% of the reported \$1,842,049,663.04 generated by Alabama sales tax in the 2009-1010 fiscal year (54).

### **Potential Number of Servings of Fruit and Vegetables Purchased with Sales Tax**

High cost is a reported barrier to the consumption of adequate amounts of fruit and vegetable servings (11). This researcher wanted to understand how many additional servings of fruits or vegetables could be purchased if the grocery tax were not levied on these goods. The researcher divided the projected tax annual for each demographic group by the cost per one-cup equivalent for fruits (\$0.69) and then by the one cup equivalent for vegetables (\$0.68). The potential number of one-cup equivalents of fruits and vegetables rounded to the nearest whole serving that could be purchased with the amount of money spent on grocery tax can be found in Tables 4.7 and 4.8. For example, an 11-year-old female could purchase 65 additional servings of fruit or 66 servings of vegetables each year with the money spent on sales tax. Males in the 16-25 age range would potentially be able to purchase the highest number of additional fruit or vegetable servings (86.97 fruit or 88.25 vegetable servings) because they are paying the most in tax for their recommended servings. This additional money could be spent on any combination of the two as well.

**Table 4.7:**

*The potential number of one-cup equivalent fruits or vegetables that men could be purchased with the amount of money spent on grocery tax, Alabama*

Age (years)	Yearly Tax	Potential 1 cup Fruit Equivalent Servings/Year	Potential 1 cup Vegetable Equivalent Servings/Year
2	\$20.00	29	29
3 to 5	\$30.08	44	44
6 to 8	\$35.04	51	52
9 to 10	\$40.00	58	59
11	\$44.97	65	66
12 to 13	\$49.93	72	73
14	\$49.93	72	73
15	\$54.90	80	81
16 to 25	\$60.01	87	88
26 to 45	\$54.90	80	81
46 to 65	\$49.93	72	73
>66	\$49.93	72	73

**Table 4.8:**

*The potential number of one-cup equivalent fruits or vegetables that women could be purchased with the amount of money spent on grocery tax, Alabama*

Age (years)	Yearly Tax	Potential 1 cup Fruit Equivalent Servings/Year	Potential 1 cup Vegetable Equivalent Servings/Year
2	\$20.00	29	29
3	\$24.97	36	37
4 to 6	\$30.08	44	44
7 to 9	\$35.04	51	52
10 to 11	\$40.00	58	59
12 to 18	\$44.97	65	66
19 to 25	\$49.93	72	73
26 to 50	\$44.97	65	66
>51	\$40.00	58	59

## CHAPTER 5: SUMMARY AND CONCLUSIONS

The purpose of this research was to determine the tax cost of meeting the USDA recommended intake of F/V for all demographic groups in the state of Alabama, the potential revenue loss if the grocery tax on fruits and vegetables were repealed, and the amount of fruit or vegetable servings individuals in all demographics could purchase if they used the money that was previously applied to grocery taxes on F/V. Data used in this study were collected by the researcher and members of the Alabama Obesity Task Force (OTF) over a three-week period in August 2011 and were combined with 2010 data from the US Census Bureau. This chapter summarizes the results and presents the conclusions of this research related to individual, household, and state level taxation on fruit and vegetable products.

The research gathered for this project spanned the state of Alabama and incorporated data from counties within each of the 11 Public Health Regions with the highest levels of poverty and with lowest levels of poverty. Data also included prices from both discount and traditional grocery chains in order to develop a comprehensive price model for various fruit and vegetable goods. These data are state-specific, and are similarly time-specific for late summer produce prices, which are variable prices and may increase or decrease on certain products based on seasonality.

### **Cost per Serving of Fruits and Vegetables in Alabama**

The average retail cost per serving for fruits and for vegetables in Alabama was \$0.69 and \$0.68, respectively. Stewart et al (32) reported the national average cost of consuming two



cups of fruit and two and a half cups of vegetables a day was \$2.50 per person in 2008. This would be \$2.63 in 2011 after adjustment for inflation (55). The cost to consume the same daily serving equivalents of fruits and vegetables in Alabama in 2011 would be \$3.08. Although this price does not seem dramatically higher than the national average, the increased amount is just shy of one additional serving of either fruit or vegetable a day. There are numerous reasons these prices could differ. Cost of food goods is a variable cost and depends largely on supply, demand, transportation costs, and cost of production. Prices may also differ based on season, region, and proximity of the food to its source. The price of food has also increased dramatically in the past few years (31, 32).

The data analyzed depict the average for a variety of fruits and vegetables in various forms. It should be noted that it is possible to consume the recommended servings of fruits and vegetables in a less expensive way by selecting the least expensive versions of these food items. However, by limiting the diet to only the least expensive types of fruits and vegetables there is a chance that an individual would decrease the variety of nutrients provided by fruits and vegetables of different colors and varieties, and may lose some nutrients if the least expensive form of a food item is a processed item. It is also possible to purchase a more expensive diet of fruits and vegetables by purchasing the higher cost items or items out of season.

#### **Average Sales Tax Revenue on Fruits and Vegetables Only**

Applying the \$0.04 Alabama sales tax, the tax on adequate servings of fruits and vegetables ranges from \$20.00 to \$60.01 for individuals. The tax burden of consuming the recommended servings of fruits and vegetables must also be examined in the context of a household setting. The tax applied to fruit and vegetable purchases for children and dependants who do not generate income comprise a portion of the household tax burden associated with

these purchases. For example, a four-person family consisting of a 45-year-old mother, 46-year-old father, 12-year-old son and 6-year-old daughter would be paying \$179.88 in tax annually to consume the recommended servings of fruits and vegetables or 0.45% of the 2010 median annual, household gross income in Alabama based on median annual gross income of \$40,547 (56). Although it is less expensive to purchase these goods for children because the recommended servings for these groups are smaller, it is important to consider the effect that this price contribution could have on the overall ability of a household, especially a low-income household, to purchase adequate servings of fruits and vegetables for all members. Because the Alabama sales tax is a flat tax, this rate is applied evenly across income levels, indicating that lower-income individuals and households will be paying a larger portion of their income to acquire the same goods as high-income households. For example, this household with an annual income of \$40,000 will pay 0.45% of their gross income on sales tax for fruits and vegetables while households with an annual gross income of \$20,000 will pay 0.90% in sales taxes on fruit and vegetable purchases only. For some households this may be a struggle. The unequal portion of income or wealth paid for a good deemed necessary for a healthy lifestyle illustrates why this tax is regressive.

Additional county and city sales taxes are also levied on groceries. Like flat taxes on housing, food items, clothing, and other necessary goods, this tax demands that to meet the same recommendations as the rest of the population, lower income households will actually be paying a higher percentage of their income. For households already listing high cost of fruit and vegetables as a barrier to their consumption, a system which forces them to pay a higher percentage of their income to consume these goods is an additional deterrent to the consumption of a diet that may reduce their risk for obesity, diabetes, and other diet related chronic diseases.

## **Tax and Policy Implications**

If everyone in the state consumed the recommended number of servings of fruits and vegetables, the state of Alabama would take in approximately \$215,494,732.16 annually as part of the reported \$1,842,049,663.04 generated by Alabama sales tax in the 2009-1010 fiscal year (54). Although this estimation seems high, it is generated assuming that each individual consumes the recommended servings of fruits and vegetables each year, however, more than 70% of Alabamians currently do not.

One important question to answer is if the reduction or elimination of tax on fruit and vegetable goods be utilized by the individual to purchase additional servings of these items. Analyses of the data demonstrate that the amount of money used to purchase these goods could provide individuals with numerous additional servings of fruits or vegetables. However, this data cannot determine if that money would be used to purchase fruit and vegetable goods.

The low price elasticity of demand for fruits and vegetables (0.7 and 0.58 respectively) would indicate that the small decrease in the cost of these items, \$0.04 and the additional county sales tax specific to each county, are possibly not a catalyst large enough to increase purchases. Economic analysis of F/V purchases indicate that as income increases, the purchases of fruit and vegetable goods does not increase at a rate as dramatic as other items including food away from home and meat products (34). Studies have demonstrated that larger decreases in price will increase the consumption may be necessary to increase consumptions of items than do smaller decreases in price for low income households (35). As an alternative to price decreases through the elimination of tax on these goods, subsidy programs could provide incentives that have been demonstrated as effective in increasing fruit and vegetable consumption in this population. Thus, health education interventions that showcase the amount spent on taxes in the grocery

store would be needed to induce consumers to purchase fruits and vegetables, if the Alabama state, county and local taxes were repealed for fruit and vegetable purchases only.

Although price reductions in fruits and vegetables have not been shown to significantly increase demand, several studies have demonstrated that targeted reductions in price have increased consumption in various populations (12, 35-39). This researcher was unable to find a study that examined price reductions targeted at the tax structure of fruits and vegetables. Some states have been successful at generating revenue by increasing the price of undesirable goods through “sin taxes,” but no state has yet attempted to reduce the financial burden of obesity by increasing access to fruits and vegetables with tax reductions.

Fruit and vegetable intake is currently below the recommendations for most Alabamians while obesity rates in Alabama are high. Adequate fruit and vegetable intake may decrease risk for chronic diseases such as heart disease, cancer, stroke, and diabetes or four of the top seven leading causes of death in Alabama in 2009 (57). In Alabama, approximately 850,000 people receive Medicaid reimbursements each month of approximately \$3000 (58). The federal government and the state of Alabama must share the costs of the Medicaid Program. Currently, the state contributes approximately 26.6% of the total costs of the program or roughly 1.4 billion dollars per year. If lower income Alabamians were to consume a healthier diet in order to maintain a healthier weight, then some costs of the Medicaid Program might be averted, specifically the costs associated with hospitalizations, stays in long-term care units, and pharmaceuticals. These costs comprise more than half of the monies spent in the Medicaid Program or 55% in 2010. Obesity and chronic disease also impact on worker productivity, thus decreasing gross earnings of Alabamians. Increased accessibility to fruits and vegetables could

potentially decrease the cost of obesity, partially absorbed by both the federal Medicaid program and by the state.

### **Limitations**

It is important to note that the dollar amounts determined by this research are projected revenue amounts and not actual revenue amounts, as this researcher could not determine the amount of sales tax contributed by the purchase of fruits and vegetables in recent years. However, information collected by the Centers for Disease Control as part of the Behavioral Risk Factor Surveillance Survey found that less than 30% of Alabama residents consumed fruit two or more times per day and vegetables three or more times per day (10). Although purchases do not necessarily lead to consumption, it is possible that this projected annual revenue is in fact higher than the actual revenue produced annually by fruit and vegetable purchases. Prices were also obtained from only grocery outlets and not from various other suppliers such as farmer's markets or roadside stands. Because of these limitations, the \$215,494,731.16 of possible revenue reported here would be an underestimate of the potential income from fruit and vegetable purchases.

Another limitation is that individuals not paying sales tax on these items were not taken into account. Individuals and households participating in government food assistance programs would not be paying tax on items provided by the program, which include fruit and vegetable goods. Therefore, the estimated amount of income that would be lost if the tax on fruits and vegetables were repealed is an inflated estimate. Taxes paid at farmer's markets, roadside stands and other fruit and vegetable suppliers were also not taken into account. Purchases of fruit and vegetable servings consumed as food away from home are also not taken into account in this study.

This research did not consider county sales tax. Although this was not part of the overall research question, it should be pointed out that each county in Alabama has the ability to impose an additional tax on goods purchased in that county. This could mean that households in one county are paying a higher tax rate than households in a county with a lower tax rate. Because county taxes were not taken into consideration for this analysis, it is impossible to determine from the data collected the actual tax cost to an individual or household attempting to purchase fruit and vegetable goods.

### **Recommendations for Future Research and Education**

Based on the information provided here though data collection and information analysis, the goals of this study have been met and the following section provides recommendations for future study to address issues raised in this investigation. It is the hope of this researcher that future studies will provide additional information about the impact of tax on fruit and vegetable consumption and what can be done to increase consumption of these foods groups in Alabama.

Several factors should be considered when determining future research to be conducted on this topic. It will be important to explore the personal impact of tax on fruit and vegetable consumption in Alabama. This research was based on quantitative data and did not investigate the consumer behaviors related to taxes incentives on these goods. Focus groups, questionnaires, and qualitative analysis should be conducted to determine if individuals find tax and not simply price, to be a barrier to purchasing fruits and vegetables.

Although the data collected for this study were comprehensive, spanning the state both geographically and economically, it would be ideal to conduct future research over a period of time where data can be collected for all seasons and food availability. Prices for fruits and vegetables tend to differ based on their growing season and may be variable throughout the year.

It would also be important to analyze data to determine if fruits and vegetables are on average more or less expensive in counties with higher poverty levels or in counties that are considered to be rural versus those considered to be urban. If lower income counties, both rural and urban, tend to have prices that are generally higher for fruits and vegetables, then reducing tax alone may not be enough to offset the cost of consuming these goods at the recommended level.

Because no state has yet eliminated taxes on targeted items such as is proposed by the findings here, researchers in Alabama have the potential to investigate the effect of a new program on the consumption of fruits and vegetables. If this tax is eliminated, the opportunity would appear for researchers to investigate if any change is seen in behavior as related to fruit and vegetable consumption or if the elimination of tax has little impact on purchases through use of Behavioral Risk Factor Surveillance System (BRFSS) data. Researchers would also have the opportunity to determine if public health campaigns emphasizing “Tax FREE” fruits and vegetables help to increase consumption more than the simple elimination of tax. The preponderance of evidence suggests that a simple tax removal would do little in the long run, given that it is a small reduction. The key to this change having a larger impact would be how the reduction or elimination of tax is framed for the consumer.

Decrease or elimination of tax on fruits and vegetables would also open new areas of research related to consumer behavior. If these programs are successful at increasing consumption closer to recommended levels it would be necessary for researchers to investigate the impact of increased consumption on growers, producers, and suppliers of produce. Researchers would also need to probe the impact that increased fruit and vegetable consumption could have on consumption of other food goods as fruits and vegetables could be purchased in place of other goods.

There is a need to examine the impact of possible reductions in tax on the disparity of consumption levels of fruits and vegetables between high- and low-income households. Current rates of consumption indicate that lower-income households and lower-income neighborhoods consume fewer servings of fruits and vegetables, possibly because they are forced to use a larger portion of their income to pay for these items (12). Long-term research could investigate rates of consumption over time, rates of chronic disease associated with low fruit and vegetable intake, and rates of obesity.

### **Conclusion and Implications**

Based on the information gathered and presented in this research, it is clear to this investigator that Alabama residents endure an added charge in the form of sales tax that increases the cost of consuming adequate amounts of fruits and vegetables. This additional price could be a barrier to consuming fruits and vegetables as part of a healthy and balanced diet, especially for some low-income households. The money that Alabama residents spend to consume fruits and vegetables could be used to purchase additional servings. Although it is difficult to predict if a behavioral change would be seen as a result of eliminating tax on these goods, it is clear that consumption of adequate fruit and vegetable servings reduces risk for disease and is beneficial to overall health and Alabama has the unique opportunity to examine the outcome of implementing reduced or eliminated tax on these goods.



## REFERENCES

- (1) Dauchet L, Amouyel P, Hercberg S, Dallongeville J. Fruit and vegetable consumption and risk of coronary heart disease: A meta-analysis of cohort studies. *J Nutr.* 2006; 136: 2588-2593.
- (2) Carter P, Gray L, Troughton J, Khunti K, Davies M. Fruit and vegetable intake and incidence of type 2 diabetes mellitus: systematic review and meta-analysis. *BMJ* 2010; 341: 1-8.
- (3) He F, Nowson C, MacGregor G. Fruit and vegetable consumption and stroke: meta-analysis of cohort studies. *Lancet.* 2006; 367: 320-326.
- (4) Lee J, Mannisto S, Spiegelman D, Hunter D, Bernstein L, van den Brandt P, Buring J, Cho E, English D, Flood A, Freudenheim J, Giles G, Giovannucci E, Hakansson N, Horn-Ross P, Jacobs E, Leitzmann M, Marshall J, McCullough M, Miller A, Rohan T, Ross J, Schatzkin A, Schouten L, Virtamo J, Wolk A, Zhang S, Smith-Warner S. Intakes of fruit, vegetables, and carotenoids and renal cell cancer risk: A pooled analysis of 13 prospective studies. *Cancer Epidemiol Biomarkers Prev.* 2009; 18: 1730-1739.
- (5) Pavia M, Pileggi C, Nobile C, Angelillo I. Association between fruit and vegetable consumption and oral cancer: a meta-analysis of observational studies. *Am J Clin Nutr.* 2006; 83: 1126-1134.
- (6) Ledoux T, Hingle M, Baranowski T. Relationship of fruit and vegetable intake with adiposity: a systematic review. *Obesity Reviews.* 2011; 12: 143-150.
- (7) Dietary Guidelines for Americans, 2010. Available at: <http://www.health.gov/dietaryguidelines/dga2010/DietaryGuidelines2010.pdf>. Accessed June 12, 2011.
- (8) USDA Food Group, Vegetables. Available at: <http://www.choosemyplate.gov/foodgroups/vegetables.html>. Accessed June 12, 2011.
- (9) USDA Food Group, Fruits, Available at: <http://www.choosemyplate.gov/foodgroups/fruits.html>. Accessed June 12, 2011.
- (10) Centers for Disease Control. State-Specific Trends in Fruit and Vegetable Consumption Among Adults --- United States, 2000--2009. Available at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5935a1.htm>. Accessed April 11, 2011.

- (11) Yeh M, Ickes S, Lowenstein L, Shuval K, Ammerman A, Farris R, Katz D. Understanding barriers and facilitators of fruit and vegetable consumption among a diverse multi-ethnic population in the USA. *Heal Promo Inter*. 2008; 23:42-50.
- (12) Dubowitz T, Heron M, Bird C, Lurie N, Finch B, Basurto-Davila R, Hale L, Escarce J. Neighborhood socioeconomic status and fruit and vegetable intake among whites, blacks, and Mexican Americans in the United States. *Am J Clin Nutr*. 2008; 87: 1883-1891.
- (13) Drewnowski A, Darmon N. Food choices and diet costs: an economic analysis. *J Nutr*. 2005; 135: 900-904.
- (14) Townsend M, Aaron G, Monsivais P, Keim N, Drewnowski A. Less-energy-dense diets of low-income women in California are associated with higher energy-adjusted diet costs. *Am J Clin Nutr*. 2009; 89: 1220-1226.
- (15) Alabama Department of Revenue. State Tax Rates. Available at <http://www.ador.state.al.us/salestax/staterates.html>. Accessed June 12, 2011.
- (16) Drewnowski A. Fat and sugar: An economic analysis. *J Nutr*. 2003; 133: 838-840.
- (17) Utsugi M, Ohkubo T, Kikuya M, Kurimoto A, Sato R, Suzuki K, Metoki H, Hara A, Tsubono Y, Imai Y. Fruit and vegetable consumption and the risk of hypertension determined by self measurement of blood pressure at home: The Ohasama study. *Hypertension Research*. 2008; 31: 1435-1443.
- (18) Centers for Disease Control. US Obesity Trends. Available at <http://www.cdc.gov/obesity/data/trends.html#County>. Accessed June 2, 2011.
- (19) Wang Y, Beydoun M. The obesity epidemic in the United States—Gender, age, socioeconomic, racial/ethnic, and geographic characteristics: A systematic review and meta-regression analysis. *Epidemiol Rev*. 2007; 29: 6-28.
- (20) Finklestein E, Trogon J, Cohen J, Dietz W. Annual medical spending attributed to obesity: payer- and service-specific estimates. *Health Affairs*. 2009; 28: 822-831.
- (21) Dinour L, Bergen D, Yeh M. The food insecurity obesity paradox: A review of the literature and the role food stamps may play. *J Am Diet Assoc*. 2007; 107: 1952-1961.
- (22) Larson N, Story M, Nelson M. Neighborhood environments, disparities in access to healthy foods in the U.S. *Am J Prev Med*. 2009; 36: 74-81.
- (23) Larson N, Story M. Food insecurity and weight status among US children and families: A review of the literature. *Am J Prev Med*. 2011; 20: 274-275.
- (24) Drewnowski A, Specter S. Poverty and obesity: the role of energy density and energy costs. *Am J Clin Nutr*. 2004; 79: 6-16.

- (25) Seligman H, Laraia B, Kushel M. Food insecurity is associated with chronic disease among low-income NHANES participants. *J Nutr.* 2010; 140: 304-310.
- (26) Seligman H, Davis T, Schillinger D, Wolf M. Food insecurity is associated with hypoglycemia and poor diabetes self-management in a low-income sample with diabetes. *J Health Care Poor Underserved.* 2010; 21: 1227-1233.
- (27) Lowry R, Kann L, Collins J, Kolbe L. The effect of socioeconomic status on chronic disease risk behaviors among US adolescents. *JAMA.* 1996; 276: 792-797.
- (28) USDA. MyPyramid Food Intake Patterns. Available at [http://www.choosemyplate.gov/downloads/MyPyramid\\_Food\\_Intake\\_Patterns.pdf](http://www.choosemyplate.gov/downloads/MyPyramid_Food_Intake_Patterns.pdf). Accessed on May 2, 2011.
- (29) Rickman J, Barrett D, Burhn C. Nutritional comparison of fresh, frozen and canned fruits and vegetables. Part 1. Vitamins C and B and phenolic compounds. *J Sci Food Agric.* 2007; 87: 930-944.
- (30) Healthy People 2020. Nutrition and Weight Status. Available at <http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=29>. Accessed June 22, 2011.
- (31) Reed J, Frzao E, Itskowitz R. How much do Americans pay for fruits and vegetables. USDA Economic Research Service. *Agriculture Information Bulletin.* 2004: 790: 1-35
- (32) Stewart H, Hyman J, Buzby J, Franzao E, Carlson A. How much do fruits and vegetables cost? USDA Economic Research Service. *Agricultural Information Bulletin.* 2011; 71: 1-31.
- (33) Drewnowski A. The cost of US foods as related to their nutritive value. *Am J Clin Nutr.* 2010: 1-8.
- (34) Frazao E, Andrews M, Smallwood D, Prell M. Food spending patterns of low-income households: Will increasing purchasing power result in healthier food choices? *USDA Economic Information Bulletin.* 2007; 29: 1-7.
- (35) Dong D, Lin B. Fruit and vegetable consumption by low-income Americans would a price reduction make a difference? USDA Economic Research Service. Economic Research Report. 2009, 70: 1-17.
- (36) Anderson J, Bybee D, Brown R, McLean D, Garcia E, Breer M, Schillo B. 5 A Day Fruit and Vegetable Intervention Improves Consumption in a Low Income Population. *J Am Diet Assn.* 2001; 101: 195-202.

- (37) Johnson D, Beaudoin S, Smith L, Beresford S, LoGerfo J. Increasing fruit and vegetable intake in homebound elders: The Seattle senior farmers' market nutrition pilot program. *Preventing Chron Disease*. 2004; 1: 1-8.
- (38) Herman D, Harrison G, Afifi A, Jenks E. Effect of targeted subsidy on intake of fruits and vegetables among low-income women in the Special Supplemental Nutrition Program for Women, Infants, and Children. *Am J of Public Health*. 2008; 98: 98-104.
- (39) French S. Pricing effects on food choices. *J Nutr*. 2003; 133: 841-843.
- (40) Center on Budget and Policy Priority. Which States Tax the Sale of Food for Home Consumption in 2009? Available at <http://www.cbpp.org/cms/?fa=view&id=1230>. Accessed on July 1, 2011.
- (41) Duffey K, Gordon-Larsen P, Shikany J, Guilkey D, Jacobs D, Popkin B. Food price and diet and health outcomes: 20 years of the CARDIA study. *Arch Intern Med*. 2010; 170: 420-426.
- (42) Jacobson M, Brownell K. Small taxes on soft drinks and snack foods to promote health. *Am J Pub Health*. 2000; 90: 854-857.
- (43) Powell L, Chiqui J, Chaloupka F. Associations between state-level soda taxes and adolescent body mass index. *J Adol Health*. 2009; 45: 57-63.
- (44) Strum R, Powell L, Chiqui J, Chaloupka F. Soda taxes, soft drink consumption, and children's body mass index. *Health Aff*. 2010; 29: 1052-1058.
- (45) Brownell K, Farley T, Willett W, Popkin B, Chaloupka F, Thompson J, Ludwig D. The public health of economic benefits of taxing sugar-sweetened beverages. *N Engl J of Med*. 2009; 361: 1599-1605.
- (46) Coleman G, Remler D. Vertical equity consequences of very high cigarette tax increases: If the poor are the ones smoking, how could cigarette tax increases be progressive? *J of Policy Analysis and Management*. 2008; 27: 376-400.
- (47) Beatty T, Larsen E, Sommervoll D. Driven to drink: Sin taxes near a border. *J of Health Econ*. 2009; 28: 1175-1184.
- (48) Tosun M, Skidmore M. Cross-border shopping and the sales tax: An examination of food purchases in West Virginia. *The B.E. Journal of Econ Analysis & Policy*. 2007; 7: 1-18.
- (49) Walker R, Keane C, Burke J. Disparities and access to healthy food in the United States: A review of food deserts literature. *Health and Place*. 2010; 16: 876-884.
- (50) The Alabama Poverty Project. Poverty Rate by County. Available at: <http://www.scribd.com/doc/54543050/2011-Data-Sheet>. Accessed on June 23, 2011.

- (51) USDA. Data Sets. Available at <http://www.ers.usda.gov/data/foodconsumption/FoodAvailDoc.htm#fruit>. Accessed May 5, 2011.
- (52) USDA. Food Buying Guide for Child Nutrition Programs, Vegetables/Fruits. Available at <http://www.fns.usda.gov/tn/resources/foodbuyingguide.html>. Accessed May 15, 2011.
- (53) U.S. Census Bureau. Single Years of Age and Sex. 2010 Census Summary File 1. Accessed September 3, 2010. Available at [http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC\\_10\\_SF1\\_QTP2&prodType=table](http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_SF1_QTP2&prodType=table).
- (54) Alabama Department of Revenue. Revenue Abstract. Accessed September 28, 2011. Available at <http://www.revenue.alabama.gov/abssep10.pdf>.
- (55) Bureau of Labor and Statistics. CPI Inflation Calculator. Available at, [http://www.bls.gov/data/inflation\\_calculator.htm](http://www.bls.gov/data/inflation_calculator.htm). Accessed on October 14, 2011.
- (56) U.S. Census Bureau. State & County QuickFacts. Accessed on October 1, 2011. Available at <http://quickfacts.census.gov/qfd/states/01000.html>.
- (57) Alabama Department of Public Health. Alabama Vital Statistics, 2009. Accessed October 1, 2011. Available at <http://www.adph.org/healthstats/assets/AVS09.pdf>
- (58) Alabama Medicaid Agency. Annual Report FY 2010. Accessed October 1, 2011. Available at [http://www.medicaid.alabama.gov/CONTENT/2.0\\_newsroom/2.3.1\\_Annual\\_Report\\_FY10.aspx](http://www.medicaid.alabama.gov/CONTENT/2.0_newsroom/2.3.1_Annual_Report_FY10.aspx)

APPENDIX

**Fruit/Vegetable Price Audit**

**Directions:** Please complete the attached form, adding any necessary information for each location. Please use the stores indicated on the cover sheet and have the following tables filled out and return mailed by September 5, 2011. A stamped, addressed envelope is provided.

Your name: \_\_\_\_\_ Phone number: \_\_\_\_\_ Email: \_\_\_\_\_

**Step 1:** Record the date you visited the store: \_\_\_\_/\_\_\_\_/\_\_\_\_

**Step 2:** Circle the day of the week: Mon. Tues. Wed. Thurs. Fri. Sat. Sun.

**Step 3:** Indicate the location of the store you are using for pricing:

City: \_\_\_\_\_ County: \_\_\_\_\_

Store address: \_\_\_\_\_

Store name: \_\_\_\_\_

**Step 4:** Please use the attached sheets to record the following information:

Fresh fruits and vegetables – price per pound

Canned/jarred/frozen/juice – price per container using the descriptions provided

\*If any item is on sale, please record the original and NOT the sale/special price.

\*If an item is not available, please use the “Note” space provided to record the name and description of a comparable substitute.

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**Fresh Fruits/Vegetable Directions: Please use the descriptions indicated to record price per pound for each item of produce. If the item is only available pre-chopped or peeled, please indicate that under “Notes.” Please do not use organic items, and if items are on sale, please indicate if the regular price.**

Fresh produce	Price/lb	Price per item	Notes
Ex. Pineapple	\$1.04		Pineapple only available peeled/cored
Ex. Apple	\$1.89		Golden Delicious
Ex. Cantaloupe		\$2.00/melon	
Orange			
Banana			
Grapes – red, seedless			
Peaches/nectarines			
Pear			
Pineapple - whole			May be sold as one item
Apple – golden delicious			
Strawberries			
Watermelon - Elliptical shaped, w/ seeds			May be sold as one item
Cantaloupe/muskmelon			May be sold as one item
Cabbage - Green			
Carrots – not baby			
Celery – whole bunch, not hearts			May be sold as one item
Corn on cob			May be sold as one item
Cucumbers			May be sold as one item
Iceberg lettuce (head)	Head		May be sold as one item
Romaine lettuce			May be sold as one item
White onions			
Baking Potatoes			
Large tomatoes			

Collard Greens			
Turnip Greens			

**Jarred/Canned Fruits/Vegetable Directions: Please use the descriptions indicated to record price per container for each food item. If the brand is unavailable, please record a comparable item and make that clear in the “notes” section.**

Item Name	Size	Price/container	Notes
Ex. Bush’s Best Baked Beans	12 oz	\$2.34	Only available in 14.5 ounce size
Ex. Del Monte Whole Kernel Corn	14.5 ounce	\$0.89	Could not find, used WalMart Great Value Brand, 14.5 ounce
Bush’s Original Baked Beans	28 oz		
Bush’s Best Pinto Beans	16 oz		
Del Monte Whole Kernel Corn	15.25 oz		
Tostitos All Natural Chunky Salsa	15.5 oz		
Green Giant Cut Green Beans	14.5 oz		
Del Monte Diced Tomatoes	14.5 oz		
Prego Traditional Spaghetti Sauce	24 oz		



**Fruits/Vegetable Juice Directions: Please use the descriptions indicated to record price per container for each item of produce. If the brand is unavailable, please record a comparable non-store brand item and make that clear in the “notes” section.**

Item Name	Size	Price/container	Notes
Minute Made Original Frozen Orange Juice, concentrate	12 oz		
Tropicana Pure Premium Orange Juice – Some Pulp	64 fl oz		

**Frozen Fruits/Vegetable Directions: Please use the descriptions indicated to record price per container for each item of produce. If the brand is unavailable, please record a comparable item and make that clear in the “notes” section.**

Item Name	Size	Price/container	Notes
Bird’s Eye Sweet Kernel Corn-no sauce	16 oz bag		
Bird’s Eye Chopped Broccoli-no sauce	10 oz box		
Ore Ida Golden Crinkles	32 oz bag		