

ACCESS TO FRUITS AND VEGETABLES FOR LOW-INCOME INDIVIDUALS:
A MIXED METHODS STUDY TO HEALTHY EATING

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ABSTRACT

Lindsey Haynes Maslow: Access to Fruits and Vegetables for Low-Income Populations: A Mixed Methods Study to Healthy Eating
(Under the Direction of Pam Silberman)

Consuming fresh fruits and vegetables (F&V), can help reduce the risk of chronic diseases. Lower-income individuals do not consume the recommended servings F&V. Access to and consumption of F&Vs is a multi-dimensional issue that includes various levels of influence. The purpose of this dissertation is to examine these various levels of influences and explore strategies to increase F&V consumption. Aim 1 assesses low-income individuals' perceptions about how F&V access programs, including mobile markets, electronic benefits (EBT) cards at farmers' markets, and community gardens, could improve F&V consumption. Participants felt that mobile markets addressed barriers such as availability of fresh F&V, convenience, and quality and variety. Participants had mixed opinions about how helpful EBT was in overcoming cost barriers. Participants had uncertainty about community gardens, mostly surrounding feasibility and implementation.

Aim 2 compared the predictive power of geographic information systems (GIS) and self-reported perceived access data for estimating the association between F&V access and consumption. Results showed GIS-based measures had more predictive power than perceived access measures for estimating the association between access and consumption. Perceived access measures (quality, variety, and convenience) were not associated with higher consumption.

Aim 3 analyzed stakeholder arguments in access to healthy food state-level legislation legislative hearing data and newspaper articles. Bills that expanded access, rather than restricted access, were most likely to pass. For enacted legislation, non-profit organizations were the largest proponents. Among stakeholder arguments used to support expanding legislation, fairness and economic security were the most frequently cited. Sugar-sweetened beverage (SSB) tax bills accounted for nearly all failed restricting legislation and were opposed by businesses. While proponents focused mainly on factual arguments, opponents focused heavily on value-laden arguments such as economic security, fear of big government, and personal responsibility. Businesses used value-laden arguments more often than non-profits.

Data from these aims suggest that changing the food environment, while also addressing how low-income individuals' perceive that environment is the first step towards increasing F&V consumption. Policy efforts should focus on improving geographic proximity to healthier food outlets and investing in nutrition education to change low-income individuals' food preferences and increase demand for fresh F&Vs.

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LIST OF ABBREVIATIONS

AIC	Akaike Information Criterion
ARRA	American Recovery and Reinvestment Act
BMI	Body mass index
EBT	Electronic benefit transfer card
EFA	Exploratory factor analysis
EPIC	European Prospective Investigation into Cancer and Nutrition
F&V	Fruits and vegetables
GIS	Geographic information systems
HFFI	Healthy Food Financing Initiative
SNAP	Supplemental Nutrition Assistance Program
SSB	Sugar-sweetened beverages
SEF	Socio-ecological framework
TANF	Temporary Assistance for Needy Families Program
USDA	United States Department of Agriculture
WIC	Women, Infant, and Children's Program

CHAPTER 1: INTRODUCTION AND LITERATURE REVIEW

Dissertation Overview

Engaging in physical activity and consuming healthy foods, including fresh fruits and vegetables (F&V), can help prevent weight gain and reduce the risk of obesity-related chronic diseases including heart disease, diabetes, and some cancers.¹ Unfortunately, most individuals, particularly those with lower incomes, do not consume the 2010 United States Department of Agriculture's (USDA) guidelines of five servings of F&V per day.^{2,3} In North Carolina, 15.2% of adults with an annual income of \$15,000 or less meet F&V intake guidelines compared to 30% of adults with annual incomes of more than \$50,000.³ Residents of low-income areas often lack access to fresh F&Vs, which is one, but not the only, factor influencing F&V consumption.⁴

Access to and consumption of fresh F&Vs can be defined as a multi-dimensional issue that can be explained using a socio-ecologic framework that includes various individual, inter-personal, community, and public policy factors influencing it. Dimensions can interact with each other to influence F&V access and, in turn, F&V consumption. Access can include geographic proximity; transportation to food outlets; convenience of purchasing and preparing fresh F&V; affordability, quality, and variety of fresh F&V.⁵ Although a myriad of factors influence F&V access, little is known about how these access mechanisms work together to affect F&V consumption. Understanding the interplay between F&V access factors and their effects on F&V consumption is important for improving F&V consumption in low-income individuals.

The rationale for the proposed research is to determine how to increase F&V access and consumption among low-income individuals and thereby improve health outcomes. The purpose of this study is to examine the influence of community- and public policy–level factors on F&V access and to explore strategies to increase F&V consumption. The central hypothesis is that the community-level F&V access programs such as mobile markets, farmers’ markets accepting electronic benefit transfer (EBT) cards, community gardens, and public policy legislation can improve different aspects of F&V access, which may lead to increased consumption among low-income individuals. This hypothesis is based partly on preliminary data from eight focus groups consisting of low-income individuals in North Carolina, which showed that F&V consumption was correlated with multiple aspects of access.

To better understand the influence of community- and public policy–level factors on F&V access and consumption, I conducted three studies with the following aims:

Aim 1: Assess low-income individuals’ perceptions about how F&V access programs in North Carolina can improve F&V access and consumption. This aim employs a qualitative approach to help better understand low-income individuals’ perceptions of F&V access programs such as mobile markets, farmers’ markets accepting electronic benefit transfer (EBT) cards, and community gardens to improve F&V access and consumption. This analysis relies on data from 13 focus groups with low-income adults across North Carolina counties.

Aim 2: Compare the predictive power of geographic information systems data and self-reported data for estimating the association between F&V access and consumption. Geographic information systems (GIS) were used to objectively measure

individual access to F&V in the community (defined as food stores that sell F&V within 1 and 3 miles of the home) and survey data were used to collect individuals' self-reported perceptions of F&V access and F&V consumption. Data used for this analysis came from baseline data from the *North Carolina Green Carts Program*—a F&V intervention that coordinates, distributes, and sells F&V in low-income communities in North Carolina—and ReferenceUSA, a commercial source that has real-time access to over 22 million businesses across the country.

Aim 3: Analyze stakeholder arguments in access to healthy food state-level legislation introduced between 2010 and 2012 in bill hearings and newspapers. The purpose of this aim is to understand the arguments used in legislation promoting access to healthy food. Using the Yale Rudd Center for Food Policy and Obesity's Legislation Database, I identified states that introduced healthy food policy legislation, such as offering financial incentives for grocery stores that locate in lower-income neighborhoods or restricting food assistance program beneficiaries from using their Supplemental Nutrition Assistance Benefits Program (SNAP) funds to purchase unhealthy foods. I then categorized these bills into one of two groups: expanding access to healthy food or restricting access to unhealthy food. I also conducted a content analysis of the arguments for and against the legislation using legislative Web sites and InfoTrac Custom Newsstand, an online search engine database with more than 1,100 major U.S. local, regional, and national newspapers.

I. Conceptual Framework

The socio-ecological framework (SEF) of health describes how health and health behaviors are affected by different levels of influence: individual (genetics and personal health beliefs), interpersonal (family members, friends, and peers), community (social

networks and norms, environmental characteristics), and societal (public policies and systems-level factors) (see Figure 1.1).⁶ More recently, researchers have applied this model to healthy eating.⁷ This variation of the SEF helped guide the development of this dissertation in that it suggests that many levels of influence are needed to improve F&V access and consumption among low-income individuals. To capture these levels of influence, Aim 1 of this study examines individuals' beliefs about how F&V access programs affect access and whether these programs will lead to increased consumption, Aim 2 examines how community-level characteristics influence F&V access and consumption, and Aim 3 explores public policies that impact F&V access.

I.A. Individual Level

Individual health behaviors both shape and are shaped by the environment, exemplifying reciprocal causation.⁶ At the individual level, F&V consumption can be influenced by factors such as age, gender, dietary intake, and socio-economic status. F&V consumption, although usually described as one behavior, is a combination of multiple separate behaviors including buying, preparing, and eating F&Vs, each of which can be influenced by the aforementioned factors.⁷ Individuals who are unaware of nutritional values or portion sizes of foods may unknowingly consume unhealthy foods in large quantities. In terms of preparing fresh F&Vs, individuals may not feel confident about how to prepare F&Vs or lack the skills to incorporate fresh F&Vs into their diet. Last, personal beliefs and taste preferences may affect F&V consumption decisions.

I.B. Interpersonal Level

At the interpersonal level, individuals' diets are influenced by their social environment, including home and family life, social networks and supports, and social and

cultural norms.⁶ Social and cultural norms influencing individual food consumption include eating out, eating as a social activity, and weekend eating. During the latter half of the 20th century, individuals and families began eating out more frequently instead of cooking in their own homes.⁸ Currently, more than 50% of the money Americans spend on food is for foods consumed outside the home.⁸ Generally, the process of eating out has become a social activity; individuals often eat out with friends after work or school and for birthdays, anniversaries, and other special occasions. Unfortunately, multiple studies have shown that people consume more calories at restaurants as well as when in groups.⁸ Additionally, research has shown that individuals tend to consume more calories during weekends.⁹

I.C. Community Level

In simplest terms, the community level is where individuals live, work, and play. Community conditions or determinants can include a community's socioeconomic status, neighborhood characteristics, and overall social capital. Geographic proximity, transportation to food outlets; convenience of purchasing fresh F&V; and affordability, quality, and variety of fresh F&V have all been cited as community-level factors affecting access and consumption.⁵ Residents of low-income areas often lack access to stores that sell healthy food and live closer to convenience stores or fast food restaurants that sell foods with low nutritional value. Additionally, lower-income individuals have more difficulty purchasing healthy foods because they are often more expensive than unhealthy and processed foods. Multiple studies have shown a relationship between food stores and obesity. Zick et al. (2009) found a significant positive relationship between the geographic proximity of a healthy food store and lower body mass index (BMI) for individuals living in low-income neighborhoods.¹⁰ Sallis and Glanz (2009) conducted a systematic review of community food

environments and found that the presence of healthy food stores (grocery stores or supermarkets) in communities was positively related to the probability of having a healthier diet.¹¹

I.D. Societal Level

At the societal level, individuals are influenced by public policies and systems affecting the distribution of power and resources. Local, state, and federal policies can impact the power and distribution of resources by enacting certain laws, such as setting the price of foods, adding incentives for healthy behaviors, and regulating the environment that supports healthy food consumption. At the societal level, governments can support healthy food consumption through financing initiatives to increase the sale of fresh produce in underserved communities, allowing farmers' markets to accept EBT for SNAP recipients, and integrating locally grown produce into the marketplace. Additionally, they can regulate the nutritional content of the food industry's products, tax unhealthy foods and beverages, and restrict unhealthy food and drinks purchased with SNAP.

Understanding the complex relationship between F&V access and consumption is an important concept for public health researchers and policymakers. Recognizing that F&V access and consumption are multi-level and bidirectional processes can help with defining, increasing, and formulating new policies for F&V consumption, which could address obesity-related chronic diseases and the healthcare costs associated with them.

II. Obesity Rates and Obesity-Related Healthcare Costs

Over the past 30 years, adult overweight and obesity rates in the United States have more than doubled, and now approximately two-thirds of adults are currently overweight or obese. Overweight and obesity levels are calculated using BMI, which is obtained by

dividing weight in kilograms by height in meters squared. Adults with a BMI of 25–29.9 are overweight and adults with a BMI of 30 or higher are considered obese.¹² Being obese increases the risk for a number of chronic diseases including coronary heart disease, cancer, high cholesterol, stroke, liver and gallbladder disease, sleep apnea, respiratory problems, arthritis, gynecological problems, diabetes, high blood pressure, asthma, and some cancers.¹

Beyond the health risks associated with obesity and obesity-related chronic disease, there are escalating medical costs as well. It is estimated that the direct medical costs of obesity in the United States are more than \$92 billion annually. Approximately 75% of U.S. healthcare dollars are spent treating chronic diseases. Researchers have found that overweight or obese employees have higher medical expenditures than healthy-weight employees, with one study showing that obese employees' medical bills were almost 40% higher than those of healthy-weight employees.¹³ Additionally, obese employees generally have higher absenteeism than healthy-weight employees, in part due to chronic health issues.¹³⁻¹⁵ A study conducted at Duke University found that the number of lost workdays due to illness or injury for obese employees was 13 times greater than healthy-weight employees.¹⁶ Because F&V consumption is associated with healthy weight,¹⁷ one suggestion to address obesity-related chronic disease is to increase consumption of fresh F&Vs.

II.A. The Protective Factors of Consuming Fresh Fruits and Vegetables

Consuming fresh F&V may serve as a protective factor against obesity and obesity-related chronic diseases,¹⁸ although study results are mixed.¹⁹⁻²² It is hypothesized that the combinations of micronutrients, antioxidants, phytochemicals, and fiber in these foods work together to protect against chronic diseases. The Centers for Disease Control and Prevention advocates that consuming F&Vs may reduce the risk of cancer and other chronic diseases;

provide vitamins, minerals, and fiber that are essential for good health; and are naturally filling but low in fat and calories.¹⁷ Although national guidelines encourage the intake of fresh, frozen, and canned F&Vs this dissertation focuses only on fresh F&Vs because they are more difficult to access for lower-income individuals and the nutritional comparability between canned and fresh F&Vs is debatable.²² Canned F&Vs and processing can often lower the nutritional content of F&V, such as having higher sodium levels.²²

II.B. Cardiovascular Disease

Multiple studies involving F&V consumption and cardiovascular disease have shown that higher consumption levels are associated with lower disease risk.¹⁸⁻⁻²⁰ A longitudinal study following 71,910 women and 38,291 men in the United States for over a decade found that high consumption of F&V (more than 5 servings per day), especially leafy greens, was associated with a modest reduction in risk of major chronic disease, primarily cardiovascular disease.¹⁸ Hung and colleagues' findings (2004) were consistent with a similar study that followed 9,608 adults and concluded that high F&V consumption was also associated with lower risk of cardiovascular disease mortality, however not non-cardiovascular disease mortality.¹⁹

II.C. Cancer

Since the 1970s, it has been suggested that high F&V intake could help reduce the risk of cancer.^{21,23-26} In studies examining dietary patterns and cancer rates between developing and developed countries, developed countries with diets high in animal products (meat, dairy, and eggs), fat, and sugar had higher rates of colorectal, breast, and prostate cancer than developing countries.²⁷ One study following immigrants from Japan to the United States found that colorectal cancer rates increased after immigrating and likely adopting a

new diet.³⁴ A prospective study following 38,540 Hiroshima survivors that stayed in Japan reported that daily F&V consumption was associated with 12% reduction in total cancer mortality and daily consumption of vegetables was associated with an 8% reduction in total cancer mortality. Statistically significant inverse associations were also found between F&V consumption and stomach, liver, and lung cancer mortality but not breast or colorectal cancer mortality.²⁶

Some studies have also found evidence to suggest that vegetable consumption can reduce the risk of prostate cancer. In a case-control study involving 628 newly diagnosed prostate cancer patients and 602 controls, men who consumed high levels of vegetables, specifically cruciferous vegetables (such as cabbage, kale, broccoli, and brussels sprouts), decreased their risk for prostate cancer. Those consuming more than 28 servings of vegetables per week had a 35% decrease in prostate cancer risk when compared to those eating less than 14 servings per week. Additionally, consuming more than 3 servings of cruciferous vegetables per week was associated with a 41% decrease in prostate cancer risk compared to those consuming less than 1 serving per week.²⁵

In the European Prospective Investigation into Cancer and Nutrition (EPIC) study, researchers examined the relationship between cancer and diet in nearly 500,000 individuals living in 10 Western European counties between 1992 and 2000.²³ During the 8-year study period, 6.7% of men and 6.2% of women were diagnosed with cancer. Researchers found an inverse relationship between cancer diagnosis and high F&V consumption, with a stronger relationship among vegetable consumption than fruits. Additionally, this relationship was stronger in women than men. Another study using the EPIC data found an inverse relationship between total F&V consumption and the risk of lung cancer.²⁴

Despite these findings, there is still mixed evidence regarding the relationship between F&V intake and cancer. Using EPIC data, multiple studies found minimal or no evidence for the protective factors of F&V against cancer.³⁵ Additionally, in Hung and colleagues' longitudinal (2004) study following 71,910 women over a decade, there was not a statistically significant relationship between high F&V consumption and cancer incidence.¹⁸

II.D. Obesity

Due to fresh F&V's low energy density (calories) and fat content, as well as high water and fiber content, it is suggested that they can prevent weight gain or maintain healthy weight.²⁹⁻³⁴ In a 12-year prospective cohort study involving 65,294 female registered nurses (the Nurses' Health Study), researchers found an inverse relationship between F&V consumption and the risk of obesity. From baseline to 12-year follow-up, women with the largest increase in F&V consumption had a 24% lower risk of becoming obese than women with the largest decrease in F&V consumption. Women with the highest F&V consumption levels also had a 28% lower risk of gaining weight than women with the lowest consumption.³⁰ In a study combining participants from the Nurses' Health Study and Health Professional Follow-up Study, a total of 120,877 men and women were followed in three 4-year intervals. Mozaffarian and colleagues (2013) determined that with each 4-year period, decrease in weight was statistically significantly associated with fruit consumption (-0.49 pounds) and vegetable consumption (-0.22 pounds), however this was clinically insignificant.³² Another study involving 481 post-menopausal women found that high intake of F&Vs and low intake of meat and cheese predicted long-term (48 months) weight loss.³⁵

However, due to the specific study population, it could be argued that these studies have limited generalizability to men and women of all ages.

In a broader study assessing adherence to the Mediterranean diet (high intake of F&Vs and cereals and low intake of meat, with olive oil serving as the main source of added fat) among men and women in Spain, researchers found that high adherence was associated with reduced risk of becoming obese among individuals.²⁹ Another European study using EPIC data from 5 countries (Italy, United Kingdom, Netherlands, German, and Denmark) found an inverse relationship between abdominal adiposity (measured in waist circumference) and F&V consumption. Among the 48,631 participants, with each additional 100 kilocalorie increment of fruits and vegetables, waist circumference decreased by 0.08 and 0.04 centimeters per year, respectively.³⁴

II.E. Methodological Limitations

Much of what is known about the protective factors of fresh F&V is from cohort, case-control, and observational studies. Although these studies can show a relationship between obesity-related disease and diet, there are often issues regarding measurement error, confounding, and omitted variable bias. Measurement error often arises during dietary recalls when individuals are asked to remember the type, quantity, and frequency of foods consumed. Individuals may under- or overestimate the true level of consumption of foods, or may report what they feel their response should be (participant bias). Confounding occurs when an individual's risk for obesity-related chronic diseases is confounded by other risk factors, such as genetic predisposition or smoking.²⁸ For example, the potential protective factors of F&V consumption are not clearly illustrated in an individual who consumes the recommended servings of F&V but also smokes and is then diagnosed with cancer later on in

life. Additionally, omitted variable bias can occur when models do not take into account factors that affect the dependent variable. If models fail to include variables that affect obesity-related chronic disease, such as family history, the results may be biased and may under- or overestimate the protective factors of F&V.

To truly understand the relationship between diet and health, randomized control studies are needed to control for measurement error and other participant biases. Randomized control trials are seen as the gold standard in the research community because their methodological design can demonstrate causality. Randomized control trials have been used to control a participant's diet over time, which is more complex and costly than case-control or observational studies can capture.³⁶⁻³⁸

Although study results are mixed, it is suggested that consuming fresh F&Vs may serve as a protective factor against obesity and obesity-related chronic diseases, including cardiovascular disease and some cancers. However, many low-income people do not consume the recommended servings per week of fresh F&V for various reasons, including lack of geographic accessibility to food outlets.

III. Food Deserts

Over the past several years, the term “food desert” has become prevalent in nutrition research and policy and is used to describe areas with a lack of access to fresh, healthy foods. The United States Department of Agriculture defines *food desert* as “urban neighborhoods and rural towns without ready access to fresh, healthy, and affordable food.” Low-income census tracts qualify as food deserts if they have “at least 33% of the census tract’s population live more than one mile from a supermarket or large grocery store or 10 miles in non-metropolitan census tracts.”³⁹ This definition was derived from a 2009 USDA national

study that examined the extent and characteristics of food access issues in the United States.⁴ Additionally, in a 2010 literature review of 29 studies using GIS to measure food environment, studies used 0.05–2 miles as the study distance, with bimodals being 0.5 and 1 miles.⁴⁰ Areas defined as food deserts may receive federal, state, and foundation funding to improve their access, whereas areas that lack the label have greater difficulty in qualifying for the same opportunities.⁴¹⁻⁴³ Many policymakers do not take into account the complex relationship between F&V access and consumption. They often focus on geographic proximity to food outlets as a precursor to funding, which may not be an appropriate measure to gauge access.

Many studies on F&V access and consumption focus on distance to and/or density of food outlets in an area.^{4,40,45} Similarly, most public policies increasing access to healthy food focus on locating supermarkets in food deserts.⁴⁶⁻⁴⁸ However, living closer to food stores that sell fresh F&V may be necessary but not sufficient to improve F&V consumption among low-income individuals. There is evidence that access to healthy food includes multiple factors, including transportation to food outlets; convenience of purchasing and preparing fresh F&V; affordability, quality, and variety of F&V; nutrition knowledge; and cooking skills.⁴⁹ These methodological limitations of defining access may be one reason for mixed results in studies assessing the relationship between F&V access and consumption.⁵⁰⁻⁵¹

IV. The Relationship between Fresh Fruit and Vegetable Access and Consumption.

Although it is hypothesized that increased F&V access leads to increased F&V consumption, findings on the relationship between F&V access and consumption are mixed. In Sallis and Glanz's (2009) systematic review focusing on geographic proximity, they found that the presence of healthy food stores (grocery stores or supermarkets) in communities was

associated with the probability of having a healthier diet.¹² Another study found that with each additional supermarket in a census tract, F&V consumption increased by 32% among African American residents.⁵² However, a longitudinal study involving over 5,000 young adults found that having geographic access to more supermarkets was unrelated to F&V consumption.⁵³ The fact that results from quantitative studies using geographic proximity to measure the effect of F&V access consumption have been mixed may indicate that other factors influence consumption. Understanding that geographic access alone might not increase consumption, other studies have focused on other factors. A recent quantitative study of 495 residents in six low income communities in Chicago, Illinois, found that regardless of geographic accessibility, participants who reported higher quality, variety, and convenience had greater F&V consumption than participants who reported lower variety, selection, and convenience.⁵⁴

IV.A. Fruit and Vegetable Access in Low-Income Populations

F&V consumption is an important component of a healthy diet because it helps prevent weight gain, fosters child development and growth, and reduces the risk of chronic disease.⁵⁵⁻⁶⁰ Unfortunately, most low-income individuals do not consume the daily recommended amounts of F&V. The link between income and F&V consumption can be partially attributed to reduced access to fresh F&V. Low-income neighborhoods tend to have less access to grocery stores, supermarkets, or farmers' markets and higher access to convenience stores or fast food restaurants that sell inexpensively manufactured nutrient-deficient foods.⁶¹ Grocery stores and farmers' markets tend not to locate in low-income neighborhoods due to perceived lack of demand.⁶²

Even when F&V are available, low-income individuals often cannot afford them. In the past 20 years, the price of fresh F&V has increased by 190%, in contrast to the price of foods having high fat and oil content, sugars and sweets, and carbonated beverages (which have increased by 70%, 66%, and 32%, respectively).⁶³ Although living close to food outlets that sell fresh F&V is important for improving access (because one cannot buy what is not available), it may not be the primary factor for increasing F&V consumption. Qualitative research has been used to determine what other factors are important for improving F&V access, as well as which factors are most important as perceived by low-income populations.

IV.B. Qualitative Studies Involving Fruit and Vegetable Access in Low-Income Populations

To date, most of the literature on F&V access has been from quantitative studies focusing on proximity and type of food stores available in the community.^{10,64-65} However, only examining one aspect of access, such as distance, neglects vital information about the insights of lower-income individuals on access to F&Vs. Qualitative research is useful for generating detailed descriptions of a phenomenon, studying complex interactions that require some context, exploring new phenomena, and generating theoretical insights.⁶⁶ To add to the knowledge gained from quantitative studies, qualitative research can be used to complement these studies and identify other F&V access factors to help gain a greater understanding of perceived barriers to low-income individuals' consumption of F&Vs.

Many low-income individuals report barriers to accessing fresh F&V in their communities. They often describe physical (distance to stores), material (quality of produce), and behavioral barriers (cooking and nutrition knowledge) that prevent them from accessing fresh F&V. A prior study by this author conducted with 8 focus groups showed that transportation to food outlets; convenience of purchasing and preparing fresh F&V;

affordability, quality, and variety of fresh F&V; nutrition knowledge; and cooking skills are all factors affecting access.⁵ Other qualitative studies have found similar findings; in 20 interviews with African Americans living in Philadelphia, reported barriers to F&V access included cost, convenience, quality, and availability. Facilitators included taste and health concerns, such as controlling weight, and blood pressure, and sugar levels (for diabetics).⁶⁸ Interviews with 28 low-income individuals in upstate New York revealed that participants had concerns about the store venue including store environment, quality, and price.⁶⁹ In another study involving two focus groups with African Americans in Pittsburgh, participants perceived that supermarkets in their community offered poorer quality produce, less nutrient-rich foods, and poorer customer service than supermarkets in higher-income, “white” neighborhoods.⁷⁰ Together, these findings suggest that low-income individuals feel that there are barriers to accessing fresh F&V, including food quality and cost, in addition to store proximity.

In 2006, Hendrickson and colleagues conducted focus groups in Minnesota with community residents (n=41), collected consumer surveys about local food outlets (n=396 in urban neighborhoods and n=400 in rural communities), and conducted an inventory of food available at stores located in the study communities.⁷¹ Focus group participants identified major barriers to shopping in their community as cost, quality of food, and variety of food. Results of the food inventory showed that fresh F&V within the more rural communities were costly, of fair or poor quality, and limited in number and variety. Food inventory results supported criticisms verbalized by focus group participants.

In another study involving 30 interviews with women in Chicago, participants described three types of barriers to accessing healthy food: material, economic, and social-

interactional barriers to food acquisition. Material barriers included availability of grocery stores in the neighborhood, upkeep and food product availability, and produce quality. Cost was listed as an economic barrier. Social-interactional barriers included safety concerns when traveling to the store, poor customer service, overcrowding in the store by other customers, and unsupportive sales practices (i.e., not accepting SNAP or EBT).⁷²

Other qualitative studies conducted in the South include a study focusing on the food shopping behaviors of middle- and low-income women in eastern North Carolina. In 2010, Jilcott and colleagues interviewed 23 women about their food shopping behaviors. Reasons for shopping at supermarkets included affordable prices, convenient location, appropriate food quality, availability of specific foods, and adequate customer service.⁷³ In another study involving five focus groups (n=48) with women in the South, reasons for shopping at certain stores included close proximity to home or work, affordable prices, good quality produce, and store characteristics (safety, cleanliness, and customer service).⁷⁴

Using qualitative research can help increase our understanding of perceived barriers to low-income individuals' consumption of F&Vs. Most qualitative studies continue to point toward factors beyond geographic proximity in influencing access to fresh F&Vs. To help address these barriers, several programs have been created to assist low-income individuals in purchasing fresh F&Vs in the community. To date, no qualitative studies have focused on other facilitators that influence low-income individuals' access to and consumption of fresh F&V, such as mobile markets, farmers' markets, and community gardens. Therefore, research from the first dissertation aim will be the first study to do this.

V. Program Options for Increasing Access to Fruits and Vegetables in Low-Income Communities

Several programs that have been used to increase access to fresh F&V in low-income communities include mobile markets, SNAP/EBT acceptance at farmers' markets, and participation in community gardens. Although research about these programs has been promising, these studies are often limited in scope, lack valid dietary assessments to assess dietary outcomes, and have modest results.

V.A. Farmers' Markets

Farmers' markets are places for individuals to purchase fresh F&V while simultaneously promoting the local economy by supporting farmers. Some reports have shown that farmers' markets can increase F&V intake among lower-income individuals.⁷⁵ Unfortunately, due to environmental and behavioral barriers such as transportation, affordability, and social and cultural norms, low income-individuals are less likely to shop at farmers' markets than middle- to higher-income individuals.⁷⁵ To address these barriers, mobile farmers markets and food assistance programs at markets have been implemented.

V.B. Mobile Farmers' Markets

Mobile markets such as farmers' markets, food trucks, and/or produce stands have been used to address transportation barriers to F&V access. In a survey that examined F&V intake and farmers' market usage among 341 lower-income individuals across 14 North Carolina counties, survey participants endorsed the idea of a having mobile market option for purchasing F&V to help increase consumption.⁷⁶ In a recent study involving the *Veggie Mobile*, a van that sells discounted produce in low-income senior housing sites in New York, researchers found that after five months of shopping at the *Veggie Mobile*, 43 out of 63 (68%) of participants reported increasing F&V intake, and among those the average was 0.37

servings/day.⁷⁷ In a similar study, researchers found that the introduction of F&V stands in low-income neighborhoods for 12 weeks increased intake in fruits, green salad, tomatoes, and other vegetables, although this increase was not statistically significant.⁷⁸

V.C. Food Assistance Programs

The main food assistance program to help low-income individuals purchase fresh F&V at farmers' markets is the Supplemental Nutrition Assistance Program (SNAP), formerly known as food stamps. Some SNAP recipients are able to use an EBT card, similar to a credit or debit card, to purchase produce at farmers' market. EBT cards were developed to reduce the stigma associated with "food stamps" and are more efficient than using paper-based coupons. The EBT system was introduced in 2004, yet acceptance of EBT at farmers' markets has been delayed due to high up-front installation costs, technical requirements, and transaction fees. In 2009, EBT sales at farmers' markets accounted for less than 1% of the \$50 billion SNAP redemptions for the year.⁷⁹

In 2008, a pilot project involving 14 individual market stands at a Philadelphia farmers' market found that after EBT implementation, EBT sales increased 33% from 2007 to 2008. The Philadelphia farmers' market EBT sales were greater than the national average of paper-based SNAP coupons.⁸⁰ Similarly, after EBT implementation at 23 of New York City's 49 farmers' markets, redemptions doubled from 2008 to 2009.⁸¹ Although these studies did not track individual F&V consumption, increases in SNAP redemptions at farmers' markets are promising and likely reflect increases in F&V purchasing.

V.D. Community Gardens

The American Planning Association defines community gardens as "shared open spaces where individuals garden together to grow fresh, healthful, and affordable fruits and

vegetables.” It is hypothesized that community gardens can improve nutrition by increasing access to fresh, affordable F&V and removing barriers to access, including location and convenience. In a cross-sectional telephone survey involving 766 adults in Michigan, researchers examined the relationship between community garden participation and F&V consumption. Individuals with household members participating in the community garden were more likely to consume F&V than individuals whose household did not participate (4.4 servings/day compared to 3.3 servings/per day, respectively). Additionally, participating households were more likely to consume the recommended five servings of F&V per day than non-participating households (30% versus 18%, respectively).⁸²

In a small cross-sectional survey involving 29 participants at a community garden in Moses Lake, Washington, more than half of the participants reported an increase in F&V consumption while participating in the community garden. Additionally, 80% of the gardeners said they used the community garden to stretch their food dollars.⁸³ More recently, an evaluation of a community garden–based obesity prevention program among 95 children found that after weekly gardening sessions and a 7-week cooking and nutrition workshop, the number of fresh, frozen, or canned F&Vs in the home significantly increased from 5.25 to 12.1 items. Items were measured by asking parents to record the name of all the fresh, frozen, and canned F&Vs available in the home and researchers counted and recorded each unique fruit or vegetable. Fresh, frozen, and canned F&V consumption among children significantly increased from 3.85 servings/day before the intervention to 6.9 servings/day after the intervention.⁸⁴ Unfortunately, because the survey questions asked parents about fresh, frozen, or canned vegetables, it is difficult to ascertain whether availability and consumption of fresh F&Vs increased due to the community garden.

Although several studies have examined the impact and effectiveness of mobile markets, SNAP/EBT at farmers' markets, and community gardens, research focusing on low-income individuals' perceptions about these programs is still lacking. The next section will discuss how policy makers can impact F&V access by discussing policy options for addressing access to healthy food.

VI. Policy Options for Addressing Access to Healthy Food

One of the most cited public health successes in influencing individual behavior is the fight against tobacco companies to reduce smoking rates. Policymakers and public health advocates successfully implemented increases in tobacco taxes, marketing restrictions, and smoke-free institutions to help reduce smoking rates. As a result, from 1965 to 2011, smoking rates decreased from 42% to 19%.⁸⁵

When dealing with public policy and regulatory strategies to influence public choice, there is a policy "intervention ladder," which includes (in order from least restrictive to most restrictive): do nothing or monitor the situation, provide information, enable choice, guide choices through changing the default policy, guide choices through incentives, guide choices through disincentives, restrict choice, and eliminate choice.⁸ Some examples of policy options to address access to healthy food using the policy ladders (from least to most restrictive) include: establishing food access task forces (provide information), integrating locally grown produce into the marketplace (enable choice), allowing farmers' markets to accept EBT for SNAP recipients (guide choices through changing the default policy), financing initiatives to increase the sale of fresh produce in underserved communities (guide choices through incentives), taxing sugar-sweetened beverages (guide choices through

disincentives), and restricting unhealthy foods/drink purchased with SNAP benefits (restrict choice).

It is suggested that state-level policies can influence multiple levels of the SEM and, in turn, affect individual behavior.⁸⁶ While addressing access to healthy food through state legislation is a considerably new policy trend,⁸⁷ it has been very effective in combating smoking and may also influence consumption of healthy foods, which may, in turn, lead to decreased obesity-related chronic diseases.

VII. Tobacco and Obesity

For decades, tobacco use was at the forefront of the public health agenda and has been one of the most cited public health movements of the 20th century.^{88,89} Policymakers and public health advocates involved in the war against tobacco implemented higher tobacco taxes, marketing restrictions, and smoke-free institutions to reduce smoking rates.⁹⁰ Two important factors that helped contribute to the fight against tobacco were a strong scientific base about the health consequences of tobacco, secondhand smoke, and growing social disapproval of tobacco companies.⁸⁸ Similar to smoking, food has psychological, social, and environmental factors that can influence behavior.⁸⁸ Because of these similarities, public health researchers are calling obesity the “new tobacco” and urge policymakers and advocates to adapt the same arguments used against tobacco for obesity.⁸⁹

VII.A. Issue Framing in the Tobacco Wars

Beginning in the 1950s, public health scientists began to confirm the serious health consequences caused by smoking. In 1964, the Surgeon General published “Smoking and Health: Report of the Advisory Committee to the Surgeon General of the Public Health Service.” The report compiled results from 7,000 articles and concluded that smoking caused

lung and laryngeal cancer in men, was a probable cause of lung cancer in women, and was the main cause of chronic bronchitis.⁹¹ From then, the tobacco industry spent the next 50 years defending their products to the American public and policymakers. The tobacco industry relied heavily on framing arguments, defined as “the process by which someone packages a group of facts to create a story”⁹² to counteract the anti-smoking pushes from the public health community.

Framing theory is built on the idea that individuals, groups, and societies view issues from various perspectives. All individuals have preconceived beliefs and values that likely have been a part of their culture for long periods of time. Speaking to these individuals’ core values and beliefs is critical in highlighting and promoting specific issues. Because individuals organize their thoughts and perceive issues differently, framing attempts to influence the way an individual thinks about an issue by selecting certain aspects of an issue to prompt a specific response.⁹² The overall goal of framing is to influence peoples’ opinions, decisions, and behaviors by appealing to their core values by using arguments or facts that they are willing to accept.⁹³

The way issues are framed can also influence policy formation.⁹⁴ As Wagenaar and Streff (1990) explain, “How questions are worded is related to how policy advocates and opponents shape and present policy options to legislators and other opinion leaders, as well as the general public.”⁹⁵ In the policymaking process, political battles are rarely won using logical and rational arguments. They are won based which side can better frame an argument that resonates with public opinion and political will.⁹⁶

In terms of the framing issues in the tobacco fight, Wallack and colleagues (1993) point out, “the battle for framing is evident in how the tobacco industry uses symbols and

images to promote itself as a good corporate citizen, defender of the First Amendment, protector of free choice, and friend of the family farmer. The industry paints anti-tobacco people, on the other hand, as zealots, health fascists, paternalists, and government interventionists.”⁹² Based on content analyses of the tobacco industry’s framing of arguments, the industry focused on four main arguments: promoting individual choice and personal responsibility (liberty), fear of big government, economic security (promoting the economy), and lack of truthfulness (manipulation and deceit of scientific evidence).⁹⁷⁻¹⁰⁰

In contrast to the tobacco industry’s frames, content analyses of the public health community’s framing of arguments in opposition to smoking, researchers found that they focused heavily on appealing to the core values of health; communicating to the public that they were protecting their health; and trying to eliminate preventable smoking-related deaths (“smoking kills”). Just as the tobacco industry pushed smokers’ rights, the public health community also tried to appeal to non-smokers’ rights, in that they had the right to be protected from secondhand smoke in public places. They also frequently used the analogy that antismoking advocates were the “underdog” fighting against huge corporations (David vs. Goliath). Last, the public health community argued that the tobacco industry was deceitful in that they manipulated their products and denied the consequences of smoking (truthfulness).¹⁰⁶⁻¹⁰⁹

VII.B. Individual Choice and Personal Responsibility

Individual choice and freedom are deeply ingrained in American culture and history; restricting choice is often synonymous with being “anti-American.” Appealing to this sentiment, the tobacco industry sought to frame smoking as an individual right and personal liberty.^{97,100} During the legislative debates on tobacco control in the 1980s, the tobacco

industry repeatedly honed in on this issue of personal freedom.¹⁰¹ Tobacco companies asserted that consumers had a right to use—or not use—tobacco as they pleased and claimed that because consumers were presented with enough information to make an informed choice about tobacco, they should be allowed to choose whether or not to smoke.⁹⁸ However, as revealed later in internal documents from the tobacco industry, consumers did not always receive appropriate information to make informed choices about smoking.

Public health advocates also appealed to personal rights—more specifically, non-smokers’ rights.¹⁰² They argued that non-smokers should have the right to be protected from secondhand smoke in the workplace and public places.¹⁰⁰ In a content analysis of the framing of tobacco issues published in *The Washington Post* from 1985 to 1996, 30% of articles from 1985 to 1982 and 20% of articles from 1993 to 1996 focused on non-smokers’ rights.⁹⁴ Additionally, the public health community promoted the idea that they too were protecting freedom of choice. They argued that because smokers were addicted to nicotine, the tobacco industry was making it difficult for people to exercise freedom of choice.¹⁰⁰

Fear of Big Government

Tobacco companies often played to the tune of “tyranny” when they suggested that interfering with personal choice was just another opportunity for big government to intervene in personal lifestyles.¹⁰⁰ They referenced the alcohol prohibition movement and cited that the government was taking away the rights of smokers,⁹⁴ and they created the phrase “Health Nazi” to depict the public health industry. In response to the proposed national tobacco legislation, the tobacco industry published a full-page advertisement in *The New York Times* and *The Washington Post* on April 22, 1998, leading with the headline, “Big Taxes, Big

Government... There They Go Again.”¹⁰³ They argued that the government should allow the market to give consumers what they wanted—their cigarettes.

David versus Goliath Analogy

In contrast to the tobacco industry’s free enterprise frame, the public health community argued that tobacco was a “killer” and that it should be regulated in society’s best interest: their health.¹⁰⁰ As one political scientist noted, “the health of free enterprise is compromised by tobacco related illnesses and deaths that cause a loss of jobs, productivity, and sales.”¹⁰³ Because tobacco consumers were addicted, public health advocates deemed that it was necessary for the government to regulate tobacco for smokers’ and non-smokers’ safety. To fight the image of Health Nazi, the public health industry portrayed itself to the public as David versus Goliath. That is, public health workers and advocates tried to protect society and fight off the “huge corporate monster” with little money and few resources.¹⁰⁰

Economic Security

The tobacco industry promoted their businesses by claiming that Americans benefited from their profits through the creation of jobs. They argued that their industry was supporting American farmers and giving the public a product they wanted.¹⁰⁰ In a content analysis of newspaper coverage of tobacco issues between 1985 and 1996, Menashe and colleagues found (1998) that two of the dominant frames used most frequently by the tobacco industry were promoting a positive economic force (i.e., Americans benefit from tobacco profits, which helps the economy by creating jobs) and that they were just doing business (they are legally operating under the American free enterprise system). Public health advocates, however, argued that smoking and the tobacco industry were actually counterproductive to economic security⁹⁴ because smoking had serious health consequences that decreased work

productivity and increased healthcare costs, both of which shook the foundation of economic security.¹⁰³

Lack of Truthfulness

During the tobacco fight, both sides argued that researchers were manipulating science as a means to deceive the public and promote their own agenda. The tobacco industry publicly questioned the link between tobacco and cancer. They announced that there was no real scientific proof to show a causal link between the two. They also referred to public health statistics as “junk science.”¹⁰⁰ Later on, the tobacco industry argued that any harms that smoking caused were so well known that tobacco users had enough information to make informed choices.

The public health community argued that the tobacco industry was deceitful in that it manipulated nicotine levels so consumers would become more easily addicted. The public health community also highlighted that the tobacco industry was not being truthful to the public when talking about the health consequences of smoking: The tobacco industry used conflicting medical evidence when communicating to the public and hid negative scientific data about the harms of smoking to undermine evidence put forth by the public health community and the Surgeon General’s reports.⁹⁴

The way a public health issue is framed affects public opinion, individual behavior, and policy formation.⁹⁴ The framing of arguments used against the tobacco industry may help lay the groundwork for the framing of arguments used in access to healthy food legislation. However, it is important to keep in mind that although food is similar to tobacco, there are dissimilarities. Though the scientific and medical community can accurately conclude that no health benefits exist for humans consuming tobacco, they cannot claim that for food. Food is

a necessary requirement for the human body and existence. Physicians can recommend to their patients that they stop smoking, but they cannot recommend that they stop eating. Therefore, although there may be similarities between access to healthy food and tobacco frames, there might be different frames used in the food debate that do not mirror the tobacco frames.

Several of the similar frames might include: the food industry being portrayed as a “killer” in that unhealthy foods can cause morbidity and mortality; the food industry impeding personal choice because consumers do not have the information they need from the food industry to make informed choices about food due to misinformation; manipulation and deceit by the food industry to target youth and minorities as consumers for their products; and David versus Goliath—the public health community is only protecting the health of society by stepping in against the “big bad food industry.” As with the anti-tobacco movement, if individuals are more aware of the health consequences of unhealthy food and the protective factors of F&Vs, they might be more likely to consume less unhealthy food and more F&Vs.

Similar to the tobacco industry’s frames, the food industry might use economic security arguments such as taxes on sugar-sweetened beverages hurt businesses by reducing profits leading to staff reductions as a consequence. They might also question scientific evidence supporting the link between sugar-sweetened beverages and obesity. The food industry could also appeal to the personal responsibility frame in that individuals are responsible for the food and beverages they consume and that obesity is caused by the irresponsibility of these individuals.

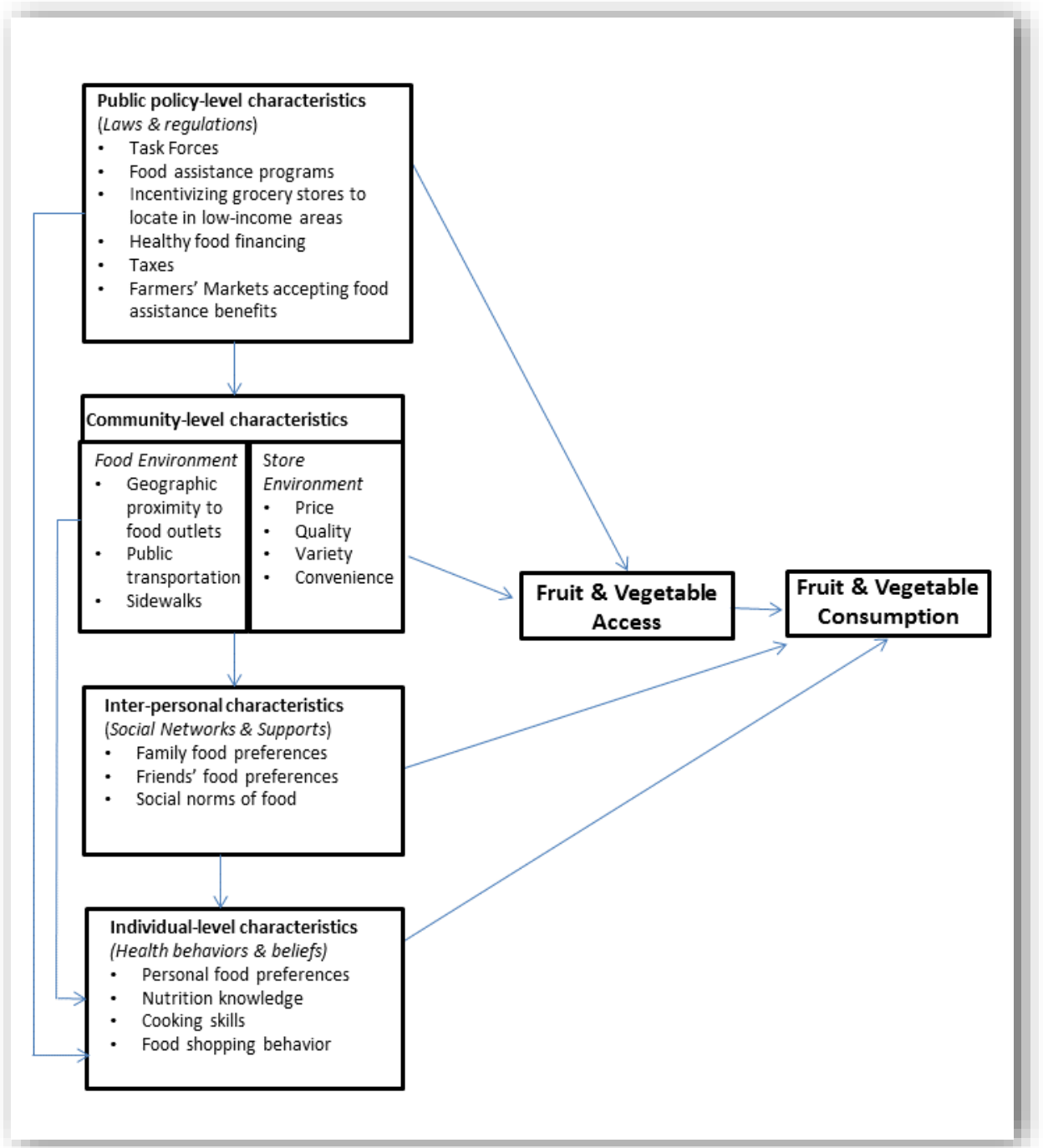
VIII. Conclusion

The United States has been experiencing increased rates of obesity and obesity-related chronic diseases for the past 30 years. F&V consumption is important for preventing chronic illness and may be one component to preventing obesity, but low-income individuals lack access to fresh F&V and more research is needed to determine the relationship between F&V access and consumption. Community- and policy-level factors may greatly influence F&V access and consumption, however many questions remain as to how they may be best implemented. Due to the complexity of inter-related factors affecting F&V consumption, mixed-methods research is needed to determine the relationship between F&V access and consumption. The research in this dissertation will provide information that addresses individual-, community-, and policy-levels factors that affect F&V access and consumption.

Aim 1 assesses low-income individuals' perceptions about how F&V access programs in North Carolina can improve F&V consumption, which can be disseminated to private and non-profit organizations, the academic community, and state governments. Aim 2 will compare the predictive power of geographic information systems and self-reported data for estimating the association between F&V access on F&V consumption. Last, Aim 3 will determine which states have passed food policy legislation, what the legislation entails, and the arguments used to support or oppose the legislation. This analysis will increase our understanding of both sets of arguments being used and may be important to advocates and policymakers who are interested in passing similar legislation in their states. These outcomes are expected to have a positive impact on community and public policies because information gained from this study will offer greater and more in-depth insight into F&V access and consumption.

FIGURES

Figure 1.1: Applying the socio-ecological framework to F&V access and consumption.



CHAPTER 2: LOW-INCOME INDIVIDUALS' PERCEPTIONS ABOUT HOW FRUIT AND VEGETABLE ACCESS PROGRAMS CAN IMPROVE ACCESS AND CONSUMPTION: A QUALITATIVE STUDY

Introduction

In the past 30 years, obesity rates among adults in the United States have more than doubled and approximately two-thirds of adults are currently overweight or obese.¹ Consuming healthy foods, including fresh fruits and vegetables (F&V), can help prevent weight gain and reduce the risk of chronic diseases, including heart disease, diabetes, and some cancers.¹ Unfortunately, most individuals, especially those with lower incomes, do not consume the recommended servings per day of F&V.^{2,3} In North Carolina, 15.2% of adults with an annual income of \$15,000 or less meet the USDA's 2010 F&V intake guidelines compared to 30% of adults with annual incomes of more than \$50,000.³ F&V intake is directly related to F&V access.^{11,52,54}

Access to and consumption of fresh F&Vs can be defined as a multi-dimensional issue that can be explained using a socio-ecologic framework that includes various individual, interpersonal, community, and public policy factors influencing it (see Figure 2.1). Dimensions can interact with each other to influence F&V access and, in turn, F&V consumption. Access can include geographic proximity; transportation to food outlets; convenience of purchasing and preparing fresh F&V; and affordability, quality, and variety of fresh F&V.⁵ However, many low-income individuals experience barriers to accessing and consuming fresh F&Vs. To address access and consumption issues, mobile markets, mechanisms to accept food assistance benefits such as Supplemental Nutrition Assistance

Program (SNAP) and Women, Infant, and Children's Program (WIC) at farmers' markets, and community gardens are all designed to overcome specific barriers. However, the literature regarding the effectiveness of these F&V access programs is limited. To date, there have been limited studies examining whether these programs adequately address access and consumption barriers as perceived by low-income individuals.

Mobile markets such as mobile farmers' markets, food trucks, and/or produce stands are convenient places for individuals to purchase fresh F&V while at the same time promoting the local economy by supporting local farmers. The Supplemental Nutrition Assistance Program (SNAP), formerly known as food stamps, is a federal food assistance program that facilitates the purchase of food by low-income families and individuals. At some farmers' markets, SNAP recipients can use an Electronic Benefit Transfer (EBT) card, similar to a credit or debit card, to purchase produce. EBT cards have the potential to reduce the stigma associated with food stamps by making it look like a credit/debit card and being more efficient than using paper-based coupons.¹⁰⁴ However, not all food vendors have EBT terminals to process transactions. A more recent type of F&V access program is a community garden, a shared space for neighborhood residents to grow fresh, healthful, and affordable produce. Recent studies about community gardens showing that they improve nutrition by increasing access to fresh, affordable F&V and removing barriers to access, including location and convenience, have been promising.⁸⁴

Although each program is intended to overcome specific barriers, more research is needed to understand how these programs work and whether they address problems of fresh F&V access and consumption. The purpose of this study is to examine how three F&V access programs (mobile markets, food assistance benefits at farmers' markets, and

community gardens) can address barriers to F&V access and consumption as perceived by low-income individuals. Understanding low-income individuals' perceptions can help identify opportunities that can be used to strengthen F&V programs and offer insight into program acceptability. Results from this study will help determine what aspects of F&V programs are important to consider and may have the biggest impact on F&V consumption, as perceived by participants.

Methods

To date, much of the literature on F&V access and consumption has been from quantitative studies focusing on proximity and type of food stores available in the community.¹⁰⁵⁻¹⁰⁷ This study uses a qualitative, rather than quantitative, research approach to describe, understand, and explain low-income individuals' perceptions about F&V access programs that may not have been identified through quantitative surveys. Qualitative research is the preferred research method when generating detailed descriptions of a phenomenon, studying complex interactions that require some context, exploring new phenomena, and generating theoretical insights.⁶⁶ To add to the knowledge gained from quantitative studies, qualitative research can be used to complement these studies and identify other F&V access factors to help gain a greater understanding of perceived barriers to low-income individuals' consumption of F&Vs.

This study uses focus groups as opposed to individual interviews because focus groups are less costly than individual interviews and they have the potential to uncover group norms through social interactions between participants, providing information that would have not been obtained through individual interviews or surveys. Focus groups encourage participants to present and defend their views and beliefs about a certain phenomenon to

others in the group.¹⁰⁵⁻¹⁰⁶ Focus groups are an opportunity for researchers to gain thick, rich descriptions about a certain phenomenon.¹⁰⁷ Because little is known about low-income individuals' perceptions about community F&V access programs, focus groups can be used to inform future quantitative work by identifying relevant themes and guide survey development.

Setting

North Carolina's population is the 17th most overweight in the country.¹ Additionally, it is ranked in the top 10 agricultural producing states in the country, with approximately 20% of commodities being crops for human consumption: 7% tobacco, 4.7% fruits and vegetables, 4.5% soybeans, and 3.4% corn.¹⁰⁸ However, North Carolina also ranks in the top 10 for food insecurity.¹⁰⁹ Because North Carolina has one of the highest rates of obesity and food insecurity in the country yet an abundance of local agriculture, it was considered an ideal setting for this study. Focus groups were conducted across five urban North Carolina counties: Buncombe, Durham, Guilford, New Hanover, and Orange counties (see Figure 2.2). These five counties were selected to help ensure geographical representation from North Carolina's three regions: the Mountains, the Piedmont, and the Coastal Plains. All counties are a mix of urban and suburban communities. Approximately 25% of adults in these counties are obese and 16% are living below the federal poverty level.

Moderator Guide

A socio-ecological framework (SEF) helped inform development of the semi-structured moderator guide. The SEF suggests that health behaviors are affected by different levels of influence: individual (genetics and personal health beliefs), interpersonal (family members and friends), community (social norms and environmental characteristics), and

societal (public policies and systems) factors.⁶ Recognizing that many factors influence F&V access, the research team included questions in the moderator guide that would capture the varying levels of influence that affect F&V access programs (see Appendix). The moderator guide was tested in a pilot focus group with 6 participants in a low-income housing site to ensure that participants could interpret and understand questions. Questions were written to elicit discussion about participants' thoughts on purchasing produce from mobile markets, ways to improve current mobile markets, ability to use EBT at farmers' markets, interest in community gardens, ideas for improving the community garden experience, and strategies for improving fresh F&V access in their community. The moderator guide was translated into Spanish by a native Spanish speaker (MPJ)^a with a master's in Clinical Psychology working on her doctorate in Health Policy at the University of North Carolina.

Recruitment

A purposive sampling strategy was used to recruit low-income individuals.¹⁰⁷ Focus group participants were recruited with the help of staff at community-serving organizations in five counties. Community organizations, including non-profit organizations, faith-based agencies, and the North Carolina Division of Public Health, were identified using the Internet. Researchers asked staff at community-serving organizations that provided services to and/or advocated for low-income individuals to help with focus group recruitment (see Table 2.1 for a list of organizations). These organizations were contacted and asked to help identify key informant staff members who could (1) provide information about the dietary concerns of people served by the organizations, (2) identify and recruit low-income

^a I am very appreciative of Monica Perez Jolles's willingness to translate the document and moderator the Spanish focus group.

individuals served by their organization who might be willing to participate in focus groups, and (3) facilitate scheduling of focus groups.

Key informants used word-of-mouth and flyers to disseminate study information to potential focus group participants served by their organizations. Using key informants to deliver study information is an effective recruitment strategy because they have established relationships with community members and are able to quickly identify potential participants that may have an interest in the study.⁶⁶ Researchers asked key informants to over-recruit for each focus in anticipation that there would be no-shows. Key informants were provided a \$40 gift card as compensation for their time.

Focus Groups

Focus groups took place at locations convenient for participants, including community centers, churches, and resource centers. Table 2.1 lists other site-specific focus group characteristics. Because of the focus group location, many of the participants knew each other and some were related. Prior to starting each focus group, participants provided informed consent and completed a demographic survey. Each focus group lasted approximately 60 minutes. Eight of the focus groups (Orange and Durham County) were moderated by the researcher and another qualitative researcher; the Latina focus group was conducted entirely in Spanish by a native Spanish speaker trained in qualitative research methods (MPJ). Participants received a \$25 grocery store gift card as compensation for their time. Personal identifying data were not collected from participants and any personal identifying information was omitted from the transcripts. Focus groups were digitally recorded.

Data Analysis

Analysis involved three phases: coding, within-group analysis, and between-group analysis. Focus groups were transcribed verbatim and analyzed in Atlas.ti 7.0 (Atlas.ti Scientific Software Development, Berlin, Germany). For the Spanish focus group, audio recordings were first transcribed in Spanish and then translated to English by native Spanish-speaking doctoral students. A general inductive approach was used to identify focus group themes with the preconception that multiple levels of influence might affect participants' perceptions of F&V programs, including how personal food preferences influenced program use (individual-level factors), how the community food and store environment created barriers to fresh F&V (community-level factors), and the role of EBT cards in promoting F&V access (policy-level factors). Participants also offered feedback on which barriers F&V programs could help overcome, as well as what they could not overcome. Using inductive analyses is considered an appropriate approach to analysis because it allowed for the capturing of ideas that might have been overlooked if using an established codebook.¹¹⁰ Inductive codes were used to identify themes and factors and connect the vast topics of conversation noted by different groups of people.

Codebook

The codebook for this study was developed through an iterative process. A second coder was used (LA)^b to help with coding to improve the study's rigor. Transcripts were read multiple times before beginning the coding process to ensure that researchers were well-versed with the data. In the initial coding phase, the lead author (LHM) and the second coder (LA) independently applied open coding to two transcripts to identify topics and issues raised

^b I am very appreciative of Lauriane Auvergne's assistance with coding the focus group documents.

by participants. Researchers compared open codes, reconciled coding discrepancies through discussions, and then merged codes into an initial coding book that was applied to all the focus groups. During the first phase of coding, codes were added and revised to help reflect and capture the data more appropriately. Researchers discussed the revisions, adapted the initial codebook, and applied the revised codebook to all focus groups for a second cycle of coding. Code discrepancies were discussed and consensus was reached to ensure inter-rater reliability.

Within- and between-group analysis.

Researchers generated reports of all text segments for each code in the focus group and examined code frequency (i.e., how often a code appeared up in a transcript) and code correlation (i.e., which codes are likely to appear up in the same sentence or topic) for each individual focus group. Code frequency and co-occurrence were used to identify patterns and themes. Once the main patterns and themes were identified, they were compared across the groups. Between-group analysis was used to determine whether identified patterns and themes were consistent across focus groups.

Results

Thirteen focus groups were conducted across five North Carolina counties (Buncombe, Durham, Guilford, Orange, and Wake) with 6–10 low-income individuals per each group between May 2011 and August 2012. Eight of the focus groups were conducted in 2011 and five were conducted in 2012. The characteristics of the 105 participants (6–11 per group) are listed in Table 2.2. Most participants were African American (70.5%) women (74.3%) with a high school education or less (53.3%). Ages ranged from 19 to 93, with the largest age category being 50–59 (22.9%). The majority of participants (70.5%) had an

average household income of less than \$20,000 per year. More than half (56.2%) received Supplemental Nutrition Assistance Program benefits (SNAP) and 48.6% received other government assistance. The majority of participants had 2 to 3 adults (60.9%) living in the household and 0 children (53.3%) living in the household.

Across the 13 focus groups, participants discussed barriers to accessing fresh F&V. They also discussed how mobile markets, food assistance benefits at farmers' markets, and community gardens addressed or did not address barriers to access, as well as new barriers introduced as the result of the three program (see Table 2.3). Each is described below.

Barriers to Fresh F&V

The top 10 barriers to purchasing fresh F&V, based on the number of times the barrier was referenced and the number of focus groups where it was raised, were: cost, cooking and nutrition knowledge, convenience, quality, personal food preferences, availability, transportation, perishability, variety, and safety (see Table 2.3). Across all focus groups, cost of produce was listed as the most prohibitive factor in accessing fresh F&V. Lack of nutrition knowledge about F&Vs and lack of familiarity with cooking fresh F&Vs were issues that younger participants, especially those with young families discussed. As one young woman commented, *“now with my generation, none of my friends cook. That Generation X, they don't cook.”* [P12:223–229]. Another difference in the level of cooking knowledge was between the men and women; most men had less cooking knowledge than the women.

Convenience of purchasing and preparing fresh F&V, having the time and energy to dedicate to cooking, was mentioned by many of the female participants, mainly those working full-time jobs and raising children. The view that cooking with fresh produce was

inconvenient was partially attributed to the fact that participants were not comfortable cooking, thus creating a lengthy and sometimes frustrating process. A male participant discussed how his wife's lack of cooking knowledge affected her ability to prepare fresh meals: *"I think the reason my wife doesn't cook is there's nothing to teach the basics of how do you plan a meal, how do you use these weird ingredients that you've never seen before, and how do you do it in 20 minutes. You can look up recipes on the Internet but you're looking at an hour and a half of prep time, and longer than that if you've never cooked before. So there's a learning curve with fresh food. It's much easier to slosh it out of a can."* [P2:139–143].

Many participants described the lack of high quality F&V (i.e., produce that is fresh, appealing, and smells "nice") in their community, which discouraged them from purchasing F&V. Individuals in several focus groups described the difference between the quality of produce in their community and higher-income communities. In response to why participants shopped at a particular store, one woman replied, *"Because the doctors and nurses go there. I usually stop there on my way from work...let's be for real, in white communities, you can get better quality of food, and in black communities, we got less quality of food."*

Not having this opportunity to taste meals with high-quality fresh F&V coupled with unfamiliarity of healthy cooking influenced participants' personal food preferences, many of whom associated "healthy" with food being bland and dull. Some participants thought that healthy foods did not taste as good and were not as filling as unhealthy foods (foods that were fried, cooked in pork fatback or a great deal of butter). Across all focus groups there were strong personal food preferences deeply rooted in family history and culture: *"People are just used to a certain way, the way that they were raised And they just go with*

it...”[P10:764]. Many African American participants described traditional Southern cuisine that they grew up on, including *soul food*, and how it was inherently less healthy than other food styles.

Most participants felt that fresh F&Vs were not readily available in their community and that they were not geographically close enough to purchase high-quality produce. This was considered problematic because several participants, especially the elderly, lacked personal transportation and required riding the bus or soliciting rides with family or friends. Additionally, perishability was considered a barrier to purchasing F&V because participants were worried about losing their money on produce that spoiled. Older participants and participants that lived alone were more concerned about perishability than participants with families because they were worried they could not use the produce quickly enough before spoiling. Participants also expressed concerns that their community grocery stores did not carry a large variety of F&V. This was especially prevalent among the Latina women because they preferred produce that was more culturally appropriate and native to their countries.

Although researchers analyzed between-focus group differences, the only notable difference between was the issue of safety. Safety was a concern for some focus groups, especially those in Durham County with higher crime rates. Some participants worried about groceries and purses being stolen when walking home with bags of groceries.

Mobile Markets

Mobile markets, such as farmers’ markets and food trucks, were described to participants as alternate food outlets that would travel directly to their neighborhoods, schools, or community organizations selling locally grown and sometimes organic fresh

F&V. Generally, the idea of mobile markets was well-received. Transportation was a concern for many participants because many did not own cars and were reliant on public transportation; having markets come to convenient locations would make it easier to purchase fresh F&V by addressing community-level geographic barriers (see Table 2.4).

In terms of how the mobile market would work in their community, many participants discussed the need for it to be easily accessible with respect to location and hours of operation. Participants felt that consistent timing, i.e., operating at the same time each week, was crucial for accessibility: *“It has to be done constantly, all the time, the same time. Just like the fruit man, with the fruit truck. Everybody knew on Saturday they were going see the fruit man because he always stopped his truck, right there.”* [P9:481–494]. In contrast, some participants argued that having flexible hours would allow more people to shop at these markets: *“When I get off work at 5 o’clock on Thursday, I may or may not make it to the farmer’s market. It’s like I need more options because I work 9 to 5 four days a week.”* [P2:223–231]. Several focus group participants stressed the importance of mobile markets accepting SNAP or EBT. As one woman commented, *“I think that would definitely help to increase the popularity of the food truck if they accepted EBT.”* [P2:395].

The participants agreed that the produce sold at the mobile market needed to be high quality and fresh. During one focus group, participants wanted to ensure that they would not be receiving “leftover” produce sold at the mobile market: *“We don’t want them to come through our neighborhood because we are low income realty. We don’t want them to bring no leftovers.”* [P1:801–805]. The sentiment of not receiving “leftovers” at mobile markets was reiterated across multiple focus groups.

When asked what would make people more likely to shop at mobile markets, participants replied good customer service, trusting the vendors, building relationships with vendors/farmers, and having tips for storing and cooking of the produce they purchased. In terms of customer service, one participant commented, *“The person coming over here shouldn’t have a snotty attitude. Come in here with an open mind.”* [P1:809–823]. The feeling of not being labeled a “low-income” customer was very important to participants. Trusting vendors or farmers was also an important factor when shopping at mobile markets. Building on trust, one mother commented that, *“Forming a relationship with the farmers has been really important for my daughter. If they meet farmers at the farmer’s market, I’m like, ‘You better eat that. The farmer grew that for you’, she will eat it. But if it comes from the store she doesn’t care. There’s no relationship and she’s not hurting anybody’s feelings. So I think that’s important.”* [P2:235–237].

Multiple focus groups commented that having information available at farmers’ markets about how to select, properly store, and cooking with produce would be helpful. As one younger participant said about produce at the farmer’s market, *“If they could have recipe cards that would be great because sometimes I don’t know...I want to cook them but I don’t know how to do it.”* [P1:901-937]. Another woman talked about having informational cards to go with certain fruits and vegetables: *“How do I know if this is ripe, what am I looking for? It would be nice to have a little description about the vegetable.”*

Although many community-level barriers could be addressed using mobile markets (availability, convenience, quality, variety, and transportation), participants brought up several issues that might not be overcome by the presence of mobile markets in their community. Many participants were skeptical that mobile markets would have affordable

produce prices, as they often compared the mobile markets to farmers' markets. In response to the cost of produce at the farmer's market a male participant commented, "*You might as well go get you some seeds and some fertilizer, and go outside and dig a hole.*" [P11:213–215]." Additionally, after purchasing produce from a mobile market, participants were still concerned about perishability. Many participants discussed individual-level barriers to F&V consumption: Several participants wondered if vendors/farmers could show them how to extend the shelf life of produce. The topic of having vendors/farmers show or teach focus group participants how to use the produce came up frequently. Many were unsure of how to prepare or cook with certain produce and felt they would need more information when purchasing these items. Additionally, some participants were hesitant about the taste of fresh F&V from the markets. One woman commented, "*Where I grew up, everything's from the store, so fresh food tastes funny to me.*" [P3:34].

Several participants talked about how mobile markets could possibly introduce new barriers to access. Community safety was a concern for some focus groups, particularly related to the amount of cash on hand that the mobile markets might carry. Participants in the Durham focus groups seemed to be much more concerned about safety than other focus groups. When talking about the possibility of a mobile produce stand, one man said, "*A lot of people probably be afraid to have a fruit stand in this neighborhood. I know I would. If that was my business, I wouldn't have it in this neighborhood. It just wouldn't be worth the risk. I probably wouldn't be afraid, but, some things are risky. That's a fact of life in this neighborhood that you might just get robbed.*" [P10:268–290]. When asked if a participant's neighborhood would be a good location for a food truck, one gentleman responded, "*You just aren't going to put a truck and park like that, because even the \$5.00 pizza man got*

problems.” Another participant joked that the food truck would not have any wheels if it parked in their neighborhood. Some focus groups were concerned about the added attention a mobile market or food truck would bring to their community, possibly unwanted attention.

Food Assistance Programs at Farmers’ Markets

Almost 60% of focus group participants received SNAP benefits. When asked how much interest participants would have in farmers’ markets that accepted EBT, several participants said that they would be more likely to shop there: *“If the local places accept food stamps, I think a lot of people would go.”* [P1:707–719]. Although accepting EBT at farmers’ markets is supposed to reduce the cost burden of purchasing fresh F&V, there were mixed opinions among the focus group participants about whether it actually would. Many participants talked about their monthly food dollar budgets and though some felt that EBT at farmers’ markets was a good idea, others questioned how far they could stretch their monthly SNAP benefits purchasing fresh produce there (see Table 2.4). Some women were dependent on using EBT at farmers’ markets: *“You may go to a tailgate market [farmer’s market] and you get there and you want to buy all this food and then you find out they don’t take EBT.”* [P3:188]. Often, when told about a F&V program, most participants asked whether the program would accept EBT or SNAP benefits.

Some participants felt they lacked funds for purchasing fresh produce in the community based on: *“I do receive public assistance but my food stamps are limited so I have to kind of budget, as they have to last from month to month.”* [P1:201]. Some participants felt they could not afford to shop at farmers’ markets. When asked why they did not shop at farmers’ markets, one woman responded, *“I’m sure everybody that receives EBT would if it was affordable; I would give it a try if it was affordable because I like fresh fruits*

and vegetables.” [P1:761–769]. Even after one farmers’ market began accepting EBT, several women perceived the price of fresh F&Vs to be so high it was not worth their time to shop there. Therefore, the monthly financial amount for SNAP recipients was considered a policy-level barrier. Regardless of whether farmers’ markets accepted EBT, participants in several focus groups felt they were not geographically close enough to purchase produce from the farmer’s market. One participant even commented that all the “good produce” was downtown at the farmers’ market, which he could not access nor afford. Participants also noted that EBT would not address other issues, including individual-level barriers, including cooking and nutrition knowledge and personal food preferences and community-level barriers such as perishability and safety.

One individual-level barrier that was a result of using EBT at farmers’ markets was stigma; some participants felt there was a stigma associated with using EBT at farmers’ markets. Although EBT cards appear to be credit/debit cards, they must be swiped in a USDA authorized terminal, thus requiring EBT recipients to ask the vendor if they accept EBT. When asked what would be a reason people would not use their EBT at farmers’ markets, one woman responded that some people are embarrassed, *“These days, I tell you, my own friends are going be embarrassed.”* [P7:427–458]. As one elderly woman commented about her recent experience at the farmers’ market: *“I just always go to the vendor first and say, ‘Do you take this?’ which is kind of creepy...But, it’s better than to have them fill up the bags and then say they can’t take it.”* [P4:85–94].

Community Gardens

Participants were asked about their previous experiences with community gardens, interest in having a community garden in their neighborhood, and ideas for improving the

community garden experience. In general, community gardens were thought of as a good way to get more members involved in healthy behaviors, including physical activity and improved mental health. As one participant commented, *“It’s therapeutic for some people to work in gardens.”* Participants also felt that community gardens would be more successful if community members were involved in the garden (not just the organizations or groups starting them). As one woman described, *“Have the community work in it together to have something as a community...That’d be something, as a community, every family in the neighborhood could feed off of, as far as fruits and vegetables.”* Although participants agreed that a community garden could be a good opportunity to get people in the community to eat more fresh F&Vs, they were also worried about the logistics of starting a garden.

When asked what would encourage more people in the community to participate in the community garden, most mentioned “knowledge” as being the solution, such as making more people in the community aware of the garden, promoting it in the neighborhood, and teaching people gardening skills (see Table 2.4). In terms of gardening skills, many of the older focus group participants were more knowledgeable about gardening than the younger participants. As one elderly gentleman commented, *“I think most people our age would know how to garden, because we grew up with gardens in our yards. But the youngsters, I don’t think they have a clue.”* Many younger participants agreed that it would be helpful to have gardening lessons, training, or workshops to prepare them for working in the community garden.

Four of the 13 focus groups had experience with community gardens in their neighborhoods. Two of the focus groups with inactive community gardens in their neighborhoods had less positive feedback than two of the focus groups with active gardens in

their neighborhoods. One of the focus groups in Buncombe County with an inactive community garden commented, *“It’s not been kept up and it’s not - it just doesn’t look like it should.”* Another woman felt that the space dedicated to the community garden was too small and it was difficult for multiple people to work in at the same time: *“There’s not room down there really for you to even try to garden. The space is, it’s not even quite as big as this kitchen. Because if we had a larger space then a lot of people in the community then we could work it.”*

In terms of the more active community gardens, these gardens had dedicated community members to oversee, coordinate, and work the garden. In another Buncombe County community garden, two of the eight focus group participants were leaders of the garden. They helped organize planting and harvesting days. A majority of the focus group participants had tasted F&V from the garden and felt that their taste was superior to what they could purchase in the grocery store. A majority of the participants emphasized that community gardens helped overcome community-level barriers such as convenience. Participants discussed the benefits of having the opportunity to walk down to the garden, select what they needed, and use it in meals. Additionally, one of the gardens was created through the help of a non-profit organization. As one participant explained, *“They provide the seedlings and plant starters. They have a couple teenagers with their summer jobs that actually work here. They provide everything. You just essentially just come out. I’ve learned a lot of things since coming out here.”*

Although many participants mentioned that community gardens could address community-level barriers to F&V access (availability, cost, transportation, quality, and variety) many expressed concerns about the logistics. In multiple focus group discussions, it

became clear that participants wanted a guarantee that they could harvest F&Vs after all the front-end work. Many participants said they would be skeptical of a community garden unless it was made clear “what product they were getting out of it” at the beginning, such as type of produce and how much. One participant commented, *“I would help, but what would be the outcome or benefits for working in this garden? Suppose you work in this garden for two, three months and you end up with a half a bushel of potatoes, three cabbages, and a couple carrots?”* Another participant was worried there would be low participation rates due to uncertainty about the garden’s success: *“I think in reality it sounds like a good idea to have a community garden. But, you have to get more people than just this group. You don’t find many people that’s going to actually want to work and not know if they’re going to benefit from it.”*

Many participants in the focus groups were worried about the possibility of new barriers being introduced as the result of the community gardens. The issue of safety was brought up frequently with community gardens; many of the participants thought that placing a community garden in their neighborhood would not be a good idea because of the high crime rates. One Durham county participant described a recent vandalism experience of a church community garden close to them: *“It was just something to make that corner look nice and it gave people something to do that had nothing to do with their time...they [the church] thought it would be a great idea, and it was. But then they see people tearing the stuff up, so now they just don’t even put the time into it.”* During another focus group, when asked why their neighborhood would or would not be a good location for a community garden, one woman responded: *“It wouldn’t produce anything because of the people that walking around in the neighborhood. We have people that come and just lift concrete*

benches and stack them for no good reason. It just wouldn't produce anything in this neighborhood. It would have to be in a safe area...where someone was actually taking care of it and make sure the weeds was out of it, and water it when it didn't rain. That kind of thing." Just as with the mobile markets, some participants were afraid that community gardens would attract unwanted negative attention to their neighborhood.

Discussion

Access to and consumption of fresh F&Vs can be explained using a socio-ecologic framework that includes various individual, inter-personal, community, and public policy factors influencing it. Many low-income individuals experience barriers to accessing and consuming fresh F&Vs. To address access and consumption issues, mobile markets, food assistance benefits at farmers' markets, and community gardens have been created to overcome specific barriers. Among the three F&V programs, mobile markets received the most interest.

Participants discussed that mobile markets could be used to overcome food environment and store environment community-level barriers such as availability of fresh F&V, convenience of purchasing and preparing fresh F&V, transportation, and produce quality and variety. These results mirror findings from a recent survey among lower-income individuals across 14 North Carolina counties in which participants endorsed the idea of a having mobile market option for purchasing F&V to help them increase consumption.⁷⁶ Recent studies have begun to examine the effectiveness of mobile markets in low-income communities. In a study involving the *Veggie Mobile*, a van that sells discounted produce in low-income senior housing sites in New York, researchers found that participants increased their F&V intake after shopping at the *Veggie Mobile*.⁷⁷ In a similar study, researchers found

that the introduction of a F&V stand in low-income neighborhoods increased intake in fruits, green salad, tomatoes, and other vegetables. Total F&V consumption increased, but the increase was not statistically significant.⁷⁸ Going forward, mobile markets should consider options for addressing other community-level barriers such as safety issues, including not having large amounts of cash on hand, having a safety officer, or locating markets in highly visible sites.

When discussing EBT at farmers' markets, there were mixed opinions among focus group participants in how successful EBT would be in overcoming community-level cost barriers. Even with food assistance benefits, some participants felt they lacked the appropriate funds to overcome the SNAP monthly allowance policy-level barrier for purchasing fresh F&V from farmers' markets. However, when discussing program options for purchasing fresh F&V in the community, most participants said their participation would be contingent on whether EBT was accepted. Although the research surrounding EBT acceptance at farmers' markets is limited, some studies show promising results. In a 2008 pilot project involving a Philadelphia farmers' market, researchers found that after farmers began accepting EBT, redemptions from the SNAP program increased 33% in one season.⁸⁰ A new individual-level barrier that participants discussed surrounding EBT cards was the stigma associated with using the card. Though less obvious than paper-based food stamps, EBT cards require vendors using credit card terminals to confirm with the customer what type of card it is (Credit, Debit, EBT). Additionally, not all farmers at farmers' markets accept EBT and some participants found it embarrassing when inquiring about the financial practices of the individual farmer.

Among the three F&V programs participants discussed, community gardens had the greatest uncertainty, mostly surrounding feasibility and implementation. Although participants agreed that community gardens could be a great place to address community-level barriers by receiving fresh, affordable, conveniently located produce, they worried that their neighborhoods would not be the best fit. Most participants questioned whether members of their community would be willing to put the time and effort into a garden if they were unsure of its outcome. Participants wondered if they had the space necessary to plant a garden, and some questioned whether their soil was “rich” enough for plants to flourish. One of the greatest concerns regarding community gardens as the issue of community safety. Fears of vandalism and unwanted attention were brought up multiple times. However, one important factor that was attributed to the successful implementation of community gardens was having a “community champion,” an individual from the community that supports the garden and encourages others in the community to support it as well.

This study shows that though mobile markets, EBT at farmers’ markets, and community gardens can be used to address access and consumption issues at various socio-economic framework levels, it is important to engage low-income individuals before implementing programs in communities. Collaborating with the program’s target market during the development phase can offer insight into how these programs can work best in certain communities under what conditions. Additionally, as shown by this study, lower-income individuals can often offer strategies to help mitigate barriers that may have not been addressed by the programs.

Limitations

Several limitations exist in this study. First, the small sample size and narrow geographic location limits generalizability of the findings. This study focuses only on urban communities in North Carolina. Rural North Carolina communities might experience unique issues to F&V access that differ from urban communities. Second, low-income individuals who choose to participate in focus groups may have different opinions about fresh F&V access programs than non-participants. Non-participants may be consuming more or less F&V and may face different barriers. Last, though focus groups also have the potential to bring about discussions not probed by the focus group moderator, some participants may not feel comfortable presenting or defending their ideas to others and may refrain from discussions. Conversely, some participants may have strong personalities or may be very influential members of the community and can undermine the focus group discussion.¹¹¹ Although some organic conversations are insightful, others may be off-topic.¹¹¹ Despite its limitations, a trained focus group moderator can help guide discussions and manage participants' varying personalities.

Policy Relevance and Implications

In 2009, the American Recovery and Reinvestment Act (ARRA) increased monthly SNAP benefits to help Americans provide food for their families during the economic downturn. However, this temporary boost ended on November 1, 2013. From now until the end of Fiscal Year 2014, SNAP recipients will receive an average of \$1.40 less per meal per person.¹¹² Focus group participants in this study receiving SNAP benefits already reported policy-level SEF barriers regarding having to stretch their food dollars with ARRA stimulus funding. As a result of federal funding changes, SNAP recipients' food budget concerns will

likely be exacerbated. In light of this study's findings, policymakers should consider alternative options for lower-income individuals to help them purchase fresh F&Vs.

In 2010, the Obama Administration authorized \$400 million for the Healthy Food Financing Initiative (HFFI) to help promote a range of interventions to expand access to healthy foods, including incentivizing grocery stores and other healthy food small business retailers to locate in underserved and rural communities, improving nutrition assistance programs, creating new business opportunities for farmers, and building community gardens.¹¹³ Because some states might be looking for options to increase access to F&V using HFFI funding, the results of the study could help inform the development of future programmatic efforts.

In October 2013, the North Carolina General Assembly's Legislative Research Commission appointed a committee to study Food Desert Zones. This committee has been asked to study the presence of food deserts in North Carolina as well as state and national-based trends in expanding access to healthy food. Focus group results from this study could be used to inform the North Carolina legislature about the importance of addressing a multitude of access barriers as well as highlight the advantages and challenges of certain F&V access programs in North Carolina.

FIGURES & TABLES

Figure 2.1: Applying the socio-ecological framework to F&V access and consumption.

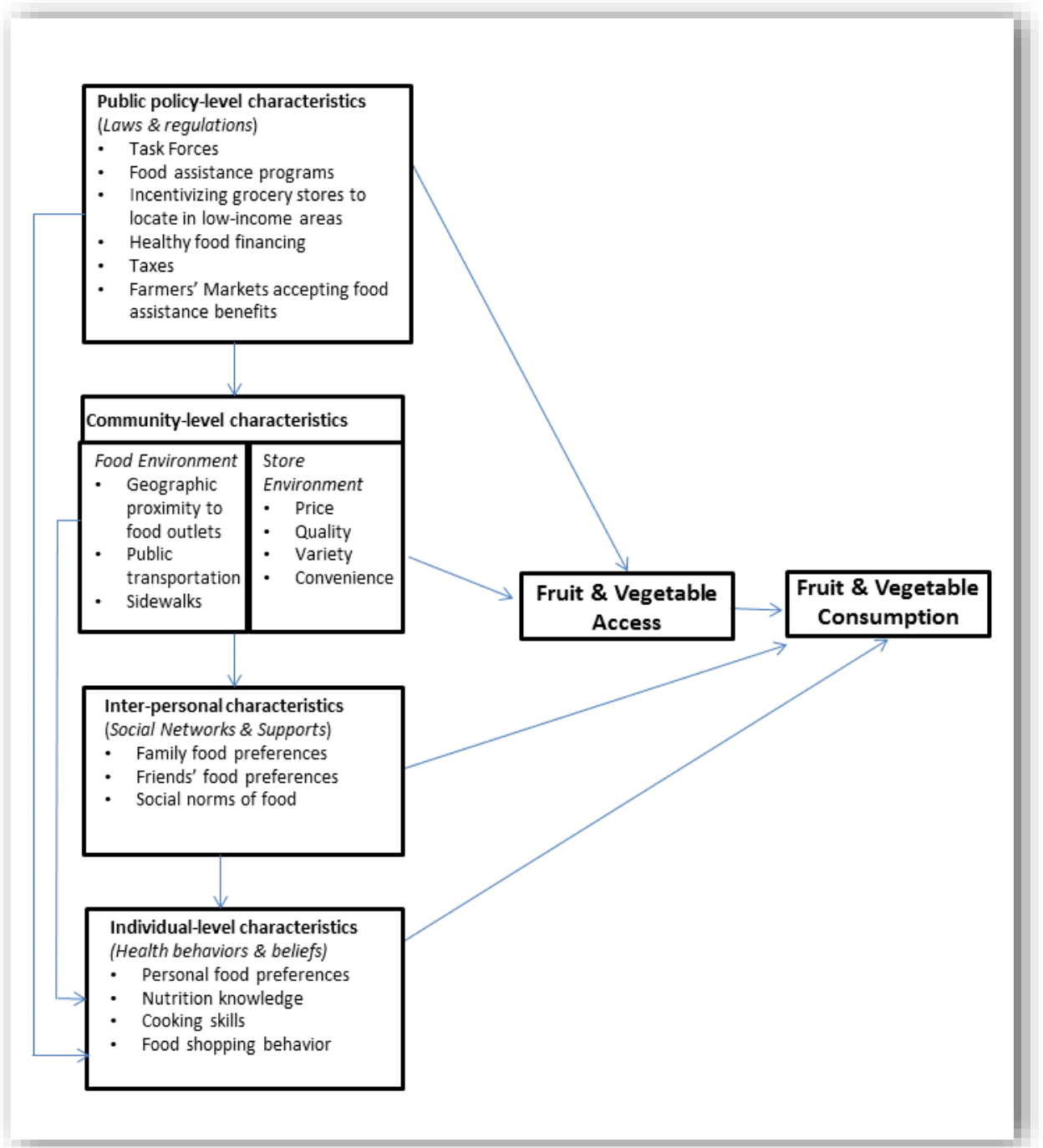


Figure 2.2: Map of North Carolina and the five study counties.

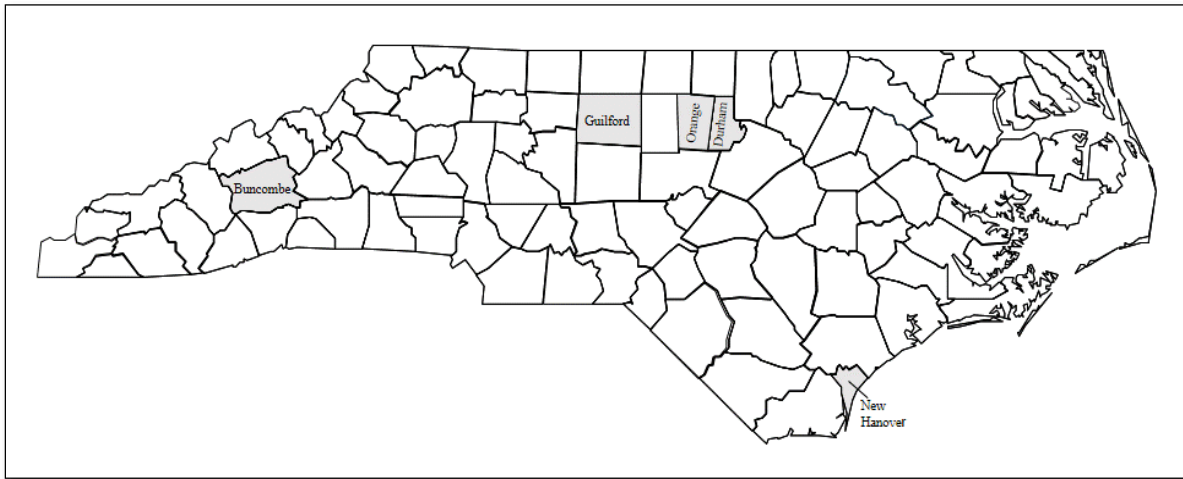


Table 2.1: Site-Specific Focus Group Characteristics

County	Focus Group Site	Site Description	Income Qualifier	N (#)	Sex	Race
Orange	Senior Center	Offers classes, wellness programs, trips, and lunches to residents ages 55 and older.	Open to seniors of all incomes. Researchers purposely targeted individuals using the Senior Center's free lunch program ^a , but did not screen based on income.	11	Female	Mixed
Orange	Senior Center			10	Male	Mixed
Orange	Family Resource Center	Located in a public housing community; offers classes and programs to neighborhood residents	Total annual household income cannot exceed 80% of the median household income issued by the Department of Housing and Urban Development for Chapel Hill.	6	Female	African American
Orange	Family Resource Center			8	Female	African American
Durham	Community Center	Located in low-income neighborhood; offers after-school classes for children and teens.	Located in a census tract in which the median household income is less than \$27,550	6	Female	African American
Durham	Recovery Shelter	Located in low-income neighborhood; offers 6 month live-in drug and alcohol rehabilitation program for homeless adults.	Located in a census tract in which the median household income is less than \$27,550	10	Mixed sex	Mixed
Durham	Small Grocery Store	Located in a low-income neighborhood; owned and operated by a non-profit that provides work-based vocational training for recovering substance abusers	Located next to three census tracts in which the median household income is less than \$27,550.	9	Mixed	African American
Durham	Latino Resource Center	Offers programs, education, and leadership development to Latinos/Hispanics in the area.	Open to Latinos/Hispanics of all incomes.	8	Female	Latina
Guilford	Church	Located in a historically African American low-income community. Offers	Located in a historically African American low-income community. Open to people of all incomes	7	Mixed	African American

		yoga, wellness workshops, youth ministry, Bibles Studies, and Choir.				
Buncombe	Resident Council Office	Located in public housing community; offers classes and programs to neighborhood residents	Section 8 Public Housing. Rent is income based; residents pay 30% of their gross income.	6	Female	African American
Buncombe	Church	Located in older Asheville community	Open to all residents	5	Mixed	White
Buncombe	Community Center	Located in largest public housing community in Asheville; offers classes and programs to neighborhood residents	Section 8 Public Housing. Rent is income based; residents pay 30% of their gross income.	8	Mixed	African American/Multi-racial
New Hanover	Community Center	Located in public housing community; offers classes and programs to neighborhood residents	Annual income does not exceed the HUD 2009 Income Limits	7	Mixed	African American

^aNote: The free lunch program is a federally funded program that applies to seniors age 60 and older.

Table 2.2: Demographic Characteristics of Focus Group Participants (N = 105)

Characteristic	Number (%)^a
<i>Sex</i>	
Male	27 (25.7)
Female	78 (74.3)
<i>Age</i>	
19-29	13 (12.4)
30-39	23 (21.9)
40-49	17 (16.2)
50-59	24 (22.9)
60-69	10 (9.5)
70-79	11 (10.5)
≥80	2 (1.9)
No Response	5 (4.8)
<i>Adults living in household</i>	
0	17 (16.2)
1-2	64 (60.9)
3-4	11 (10.5)
≥ 5	4 (4.8)
No Response	9 (8.6)
<i>Children living in household</i>	
0	56 (53.3)
1-2	31 (29.5)
3-4	14 (13.3)
≥5	1 (0.95)
No Response	3 (2.9)
<i>Education</i>	
8th grade or less	8 (7.6)
Some high school	15 (14.3)
High school degree/GED	33 (31.4)
Some college	31 (29.5)
College graduate	11 (10.5)
More than college	7 (6.7)
<i>Marital Status</i>	
Never been married	38 (36.2)
Married/living with partner	27 (25.7)
Separated	9 (8.6)
Divorced	21 (20)
Widowed	9 (8.6)
No Response	1 (1)

<i>Household Income</i>	
≤ \$10,000	50 (47.6)
\$10,000-\$19,999	24 (22.9)
\$20,000-\$29,999	10 (9.5)
\$30,000 - \$49,999	9 (8.6)
≥ \$50,000	3 (2.9)
No Response	9 (8.6)
<i>Race/Ethnicity</i>	
White	19 (18.1)
African American	74 (70.5)
Hispanic	8 (7.6)
Multi-racial	3 (2.9)
No Response	1 (1)
<i>Receive SNAP Benefits^b</i>	
No	45 (42.9)
Yes	59 (56.2)
No Response	1 (1)
<i>Receive Government Assistance^c</i>	
No	48 (45.7)
Yes	51 (48.6)
No Response	6 (5.7)

^aPercentages do not add to 100% due to rounding.

^bSNAP= Supplemental Nutrition Assistance Program

^cGovernment assistance = Supplemental Food Program for Women, Infants and Children (WIC), Temporary Assistance for Needy Families (TANF), Medicaid, or WorkFirst

Table 2.3: Top 10 Barriers to Food Access as Perceived by Participants by SEF-Level

Barrier	Definition	Socio-Ecological Framework Level of Influence	Number of Focus groups that referenced barrier	Total references across all focus groups ^a
Cost	Cost of F&Vs (whether expensive or inexpensive) as barrier to purchasing	Community: Store Environment	13	137
Cooking & nutrition knowledge	Knowledge, or lack of knowledge, on how to prepare, assemble, and cook fresh F&Vs. Participant expresses knowledge about nutrition.	Individual	13	97
Convenience	Convenience in location, time it takes to shop, and in cooking fresh F&Vs; also refers to individuals' personal schedule, or a food outlet hours of operation	Community: Store Environment	12	59
Quality	Quality of the F&V's freshness, appearance, and smell	Community: Store Environment	13	49
Personal food preference & needs	Mention of what a participant wants to eat, wishes they could eat, and what they eat currently. Also refers to taste -- whether good or bad -- and how the food is perceived by the participant; Can also refer to unwillingness to change food habits due to personal taste	Individual	12	47
Availability	How able participants are to accessing fresh F&V in their community. This includes the availability of F&V in certain stores, or availability of food outlets in the community. May also sound like a participant is describing "geographic location."	Community: Food Environment	11	41
Transportation	Car, bus, bike, or walk -- any mode of transportation to and from places to buy fresh F&Vs	Community: Food Environment	13	32
Perishability	Consideration of how long the F&V will keep once purchased, i.e., produce spoiling too quickly	Community: Store Environment	11	24
Variety	Variety of different types of fresh F&Vs; having have the opportunity to purchase the produce a participant wants	Community: Store Environment	9	22
Safety	Feeling safe when traveling to or from a food outlet, and during the shopping process	Community: Food & Store Environment	6	12

^aNote: Total references were calculated based on the number of times each participant mentioned the code.

Table 2.4: Barriers addressed and not addressed by F&V Programs by SEF-Level

	MOBILE MARKETS			EBT AT FARMERS' MARKETS			COMMUNITY GARDENS		
SEF-LEVEL	<i>Barriers Addressed</i>	<i>Barriers not Addressed</i>	<i>New Barriers Introduced</i>	<i>Barriers Addressed</i>	<i>Barriers not Addressed</i>	<i>New Barriers Introduced</i>	<i>Barriers Addressed</i>	<i>Barriers not Addressed</i>	<i>New Barriers Introduced</i>
Individual		<ul style="list-style-type: none"> • Cooking & nutrition knowledge • Personal food preferences 			<ul style="list-style-type: none"> • Cooking & nutrition knowledge • Personal food preferences 	<ul style="list-style-type: none"> • SNAP stigma 	SNAP stigma	<ul style="list-style-type: none"> • Personal food preferences 	
Community: Food environment	<ul style="list-style-type: none"> • Availability • Transportation 		<ul style="list-style-type: none"> • Neighborhood safety 		<ul style="list-style-type: none"> • Neighborhood safety • Transportation 		<ul style="list-style-type: none"> • Availability 		<ul style="list-style-type: none"> • Neighborhood safety
Community: Store environment	<ul style="list-style-type: none"> • Quality • Variety • Perishability • Convenience 	<ul style="list-style-type: none"> • Cost 	<ul style="list-style-type: none"> • Vendor Safety 	<ul style="list-style-type: none"> • Cost 	<ul style="list-style-type: none"> • Vendor safety • Perishability • Cost 		<ul style="list-style-type: none"> • Quality • Variety • Perishability • Cost 		
Policy					<ul style="list-style-type: none"> • SNAP monthly allowance 				

CHAPTER 3: COMPARING THE PREDICTIVE POWER OF GEOGRAPHIC INFORMATION SYSTEMS AND SELF-REPORTED DATA FOR ESTIMATING THE ASSOCIATION BETWEEN F&V ACCESS AND CONSUMPTION.

Introduction

Over the past several years, the term “food desert” has become prevalent in nutrition research and food policy and is used to describe areas that lack of access to fresh, healthy foods. The United States Department of Agriculture (USDA) defines *food desert* as “urban neighborhoods and rural towns without ready access to fresh, healthy, and affordable food.” Low-income census tracts qualify as food deserts if they have “at least 33% of the census tract’s population living more than one mile from a supermarket or large grocery store or 10 miles in non-metropolitan census tracts.”³⁹ Availability and type of food stores may influence individuals’ diets.⁵² Consuming healthy foods, including fresh fruits and vegetables (F&V), can help reduce the risk of obesity-related chronic diseases, including heart disease, diabetes, and some cancers.¹ Grocery stores and supermarkets are more likely to offer fresh and less processed food than food outlets such as convenience stores, corner stores, or gas stations.¹¹⁴

Communities identified as food deserts using the USDA’s definition may receive federal, state, local, and public or private funding to improve access to healthy food, whereas communities that lack the food desert label may have greater difficulty in qualifying for the same opportunities.⁴¹⁻⁴³ Many public policies increasing access to healthy food focus on locating grocery stores in food deserts.⁴⁶⁻⁴⁸ However, living closer to food stores that sell fresh F&V may not be sufficient to improve F&V consumption among low-income individuals.

Access to and consumption of fresh F&Vs should be viewed as a multi-dimensional issue that can be explained using a socio-ecologic framework, which includes various individual-, interpersonal-, community-, and public policy-level influences (see Figure 3.1).¹¹ Dimensions can interact with each other to influence F&V access and, in turn, F&V consumption. In addition to geographic proximity, individuals' perceptions of convenience of purchasing and preparing fresh F&V and affordability, quality, and variety of fresh F&V have been cited as influencing F&V access and consumption.⁵

Many studies on F&V access focus only on distance to and/or density of food outlets in an area using geographic information systems (GIS).^{4,40,45} However, not taking into account the complex relationship between individuals' perceptions of F&V access and consumption may limit our understanding of the association between F&V access and consumption. Nutrition and food policy researchers need to develop more comprehensive methodologies to examine access and consumption that include different and combined measures. Therefore, this study uses a more advanced methodology for examining F&V access and consumption by comparing GIS-measures ("GIS-based") with self-reported measures ("perceived access"). Additionally, four distinct self-reported perceived access measures (convenience, quality, variety, and affordability) are explored in the context of a perceived access scale.

The purposes of this study are to (1) determine whether four self-reported items measuring perceived access to F&V can be combined into one "perceived access" scale, (2) determine whether the perceived access scale is correlated with GIS measures of access, and (3) compare the predictive power of GIS-based versus perception-based measures for estimating the association between F&V access on F&V consumption. Discovering

overlooked access measures is important because the majority of research on the food environment and food policy is guided by GIS data. If this research methodology is flawed, then programs and policies aimed at improving F&V access based on GIS results may not be as effective as using perception-based results. Furthermore, some methods may be more ideal for certain study designs, and understanding the tradeoffs may offer useful guidance for future research designs. For example, using questionnaires to survey community members about food access may be more appropriate for studies with longer timelines and funding, whereas using GIS to measure food access takes less time and funding.

Methods

Sample and Data Sources

Data used for this study comes from two sources: survey data collected from the UNC-Chapel Hill North Carolina Green Carts Program (PI: Lucia A. Leone) and food outlet information from ReferenceUSA (Infogroup, Inc.: Hershey Company). The North Carolina Green Carts Program is a F&V intervention that coordinates, distributes, and sells F&V in low-income communities in North Carolina. It includes a total of 300 participants in 12 community sites across three North Carolina metropolitan counties: Durham, Orange, and Wake.

Eligibility Criteria. Community sites were eligible for the North Carolina Green Carts Program if they were (1) organizations focusing on serving low-income families (i.e., public housing, community centers, technical community colleges, and health departments) **or** were located in an area that lacked a grocery store selling a variety of F&V within 1 mile of their site, and (2) served a minimum of 40 households. Individuals were eligible for the study if they (1) were responsible for 50% or more of grocery shopping for the household, (2) were at

least 18 years of age, (3) were able to speak English, (4) planned to continue as a member of the community site for at least 18 months, and (5) indicated that they would be interested in purchasing from the Green Cart Program if it came to their community.

Recruitment and Enrollment. The North Carolina Green Cart project coordinator was responsible for recruiting community sites. The project coordinator identified and arranged initial meetings with potential community sites to explain the study. Coordinators at community sites were asked to mail information about the study to individuals and families that lived at or regularly frequented that site. Coordinators then provided UNC researchers with names and addresses for anyone who did not opt out of the study. Recruited sites were excluded from the study if they were unable to obtain at least 25 participants. As of February 2014, a total of six community sites from three North Carolina counties were recruited for the Green Cart study and thus are included in this analysis.

Data Collection. Participants who did not opt out of the study were contacted by phone by a member of the research team. During the initial phone call, a graduate research assistant explained the purpose of the study, obtained informed verbal consent, and either scheduled or completed the baseline survey. Baseline surveys were administered over the telephone and took approximately 30 minutes to complete.

Study Instrument. The NC Green Carts baseline survey included both previously validated items and new items adapted from previously validated measures. The survey contained sections on the following topics: perceived access to F&V in the community, dietary habits, cooking behaviors, transportation, and demographic information. This study used multiple variables from the survey: four variables measuring self-reported perceived

access to F&V, two variables measuring self-reported daily F&V intake, participant demographics, and participant's home address.

F&V intake was measured using the validated 17-item National Cancer Institute (NCI) fruit and vegetable screener, which measures average frequency of consuming F&V and the approximate serving size of each type of fruit or vegetable consumed.¹¹⁵⁻¹¹⁶ In a randomized NCI study, 632 participants were mailed the 17-item F&V screener and 242 (38%) responded. The authors concluded the instrument provided a valid measure of F&V intake; R^2 values between the 17-item F&V screener and true F&V intake were 0.67 for males and 0.51 for females. Men were more likely to underestimate F&V servings, whereas women were more likely to overestimate servings.¹¹⁵

Questions measuring perceived access including variety, quality, affordability, and convenience of purchasing fresh F&Vs have been validated by Nutrition Environment Measurement Survey Perceived Food Environment Study and used in other studies.^{11,116} In a study involving predominantly Latinos and African Americans living in New York City, 48 participants completed face-to-face and telephone interviews about access to healthy food in their neighborhood environment at two time points. The average age of participants was 38 and approximately 75% of the participants were female. The internal reliability measure (Cronbach's alpha) was high for both time points ($\alpha=0.91$ and $\alpha=0.94$), showing excellent internal consistency.¹¹⁷ In another study testing the reliability of these measures with 5,988 participants living in Maryland, New York, and North Carolina, Cronbach's alpha and test-retest reliability was still fairly high ($\alpha=0.78$, $p=.69$).¹¹⁸ Additionally, the NC Green Carts Program conducted cognitive interviewing with 9 low-income patients at Piedmont Health

Services, a reduced-price health clinic in Carrboro, NC, to determine the appropriateness and understandability of each survey question.

Other Data Source. Food outlet information was obtained from ReferenceUSA.¹¹⁹ ReferenceUSA is a commercial source that has real-time access to over 22 million businesses across the country and has been used in multiple food access studies.¹²⁰⁻¹²¹ A custom search was conducted using ReferenceUSA to identify supermarkets, grocery stores, and convenience stores (with or without gas stations) for each of the study's three counties (Durham, Orange, and Wake). No participants lived within 3 miles of a county border for a county that not included in the study to necessitate collecting data from additional neighboring counties. Using the North American Industry Classification System (NAICS), the following NAICS codes were used to identify supermarkets (445110), grocery stores (445110), convenience stores (445120), and convenience stores with gas stations (447110). (See Table 3.1 for code definitions and examples.) To verify ReferenceUSA food outlets, a simple random sample of 20% of the food outlets were called to confirm they were still operating. Approximately 90% of the stores contacted were still operating.

Geocoding

To calculate the number of food outlets within 1 and 3 miles of a participant's home, address information was geocoded and uploaded to ArcMap version 10.1 (ESRI 2012. ArcGIS Desktop: Release 10.1. Redlands, CA: Environmental Systems Research Institute). Each address was entered into Google Earth to obtain the latitude and longitude coordinates, which were then imported into ArcMap. A total of 122 participant addresses were obtained from the Green Cart Survey. However, 7 of the addresses were P.O. Boxes and therefore

could not be matched with a specific latitude and longitude. Therefore, only 115 participant addresses were geocoded and imported to ArcMap.

After conducting a custom search on ReferenceUSA using NAICS codes to identify supermarkets, grocery stores, convenience stores, and convenience stores with gas stations within each county, the business addresses were geocoded and imported into ArcMap. Due to the similarity of the food outlets, grocery stores and supermarkets were combined into one category (“grocery store”) and convenience stores and convenience stores with gas stations were combined into one category (“convenience store”).

Measures

Dependent Variable. The dependent variable of interest is total F&V consumption (average servings per day over the past month). This was measured using the following two questions from the NC Green Carts Program Baseline Survey, obtained and previously validated from the NCI’s 17-item F&V screener¹¹⁵: 1) On average, how many servings of vegetables did you usually eat each day? A serving is one small vegetable (a small potato) or 1/2 cup of chopped fresh or canned vegetables, and 2) On average, how many servings of fruit did you usually eat each day? A serving is one small fruit (a small apple) or 1/2 cup of chopped fresh or canned fruit. Include only fresh, frozen, or canned fruits, not fruit juice.

Independent variables. The key independent variables are density of food outlets (GIS measures) and perceived access.

Density of food outlets. Food outlets were separated into two categories: (1) supermarkets/grocery stores, and (2) convenience stores (with or without gas stations). To calculate the density of grocery stores and convenience stores within 1 and 3 miles from a participant’s home, food outlet data and participant data had to be linked. ArcMap’s “buffer”

feature allows a user to create a circular buffer around a data point (in this case, the participant's home). Two separate buffers were created: a 1 mile and 3 mile circular buffer around each participant's home address (see Figure 3.2). ArcMap's "intersection" analysis tool was used to determine the number of food outlets that were located within each participant's circular buffers. These data were then exported into a file suitable for statistical analysis containing the number of grocery stores and convenience stores within 1 and 3 miles of a participant's home. Density was measured by the number of food outlets in each of the two categories within 1 and 3 miles from a participant's home.

Perceived access: Self-reported F&V access was measured using the following four questions from the NC Green Carts Program Baseline Survey: 1) It is easy to buy fresh fruits and vegetables in my neighborhood; 2) There is a large selection of fresh fruits and vegetables in my neighborhood; 3) The fresh fruits and vegetables in my neighborhood are high quality; 4) I can afford to buy enough fresh fruits and vegetables for my family. Participants chose responses from a 5-point Likert scale ranging from "Strongly Agree" to "Strongly Disagree." Participants were asked to think about their neighborhood as the area within a 20-minute walk or about a mile from their home.

Control Variables. Participant-level characteristics included gender, age, and receipt of government assistance, including Supplemental Nutrition Assistant Program (SNAP); Women, Infant, and Children's (WIC) program; Medicaid; Temporary Assistance for Needy Families (TANF); free or reduced school lunch; Head Start; and Social Security Disability Benefits.

Analysis

Three types of analyses were used for this study: (1) exploratory factor analysis (EFA) to determine whether four self-reported perceived access items could be combined into one scale, (2) pairwise correlation to determine if the perceived access scale was correlated with GIS measures, and (3) Poisson regression to compare the predictive power of GIS measures and the perceived access scale for estimating the effect of F&V access on F&V consumption. Based on the small sample size of the study, p-values less than 0.10 were considered statistically significant.

Factor analysis is a multivariate statistical method designed to identify patterns of associations that exist among variables or items that may form one or more factors or scales.¹²³ White summarized this approach as “Factors are determined solely on the basis of statistical properties; items load on a given factor according to their intercorrelations with other items of the scale.”¹²⁴ For this study, four perceived access variables—convenience, quality, variety, and affordability—were tested to see if they could form a perceived access scale. As suggested by Shea, factors were kept based on the following criterion: eigenvalue greater than 1 and factor loadings greater than 0.6.¹²⁵ Variables with high factor loadings were considered a good representation of the measured construct, perceived access.¹²⁶ Additionally, perceived access variables were examined using Pearson Correlations (>.70 is associated with strong correlations) and Cronbach’s coefficient alpha as a measure of the scale’s reliability. Reliability above 0.70 was considered adequate for making group level measurement and comparisons and reliability above 0.90 was considered adequate for individual level measurement.¹²⁶

The second type of analysis used pairwise correlation to determine the relationship between GIS and perceived access. Pairwise correlation measures the strength (low versus high correlation) and direction (positive versus negative association) of the relationship between two variables. Correlation coefficients can range from -1 to +1, with -1 representing a perfect negative correlation and +1 representing a perfect positive correlation between two variables. A correlation coefficient of 0 indicates there is no relationship between two variables. Pairwise correlation was used to determine if there were strong or weak relationships between GIS measures and perceived access measures, as well as if perceived access was more or less correlated among specific populations (e.g., by education, age, sex, and receipt of government assistance).

The third type of analysis used in the study was the Poisson regression model to determine whether GIS or perceived access measures were associated with F&V intake. The Poisson regression model allows the dependent variable to be a count of an event that is expected to occur during a fixed time period and can be specified according to a Poisson distribution whereas:

$$\text{Prob}(y | X\beta) = \frac{e^{-X\beta} e^{X\beta y}}{y!} \text{ for } y = 0, 1, 2, 3 \dots$$

where y is the number of F&V servings per day. Poisson regression analyses were performed with the statistical software program Stata: Release 12 (StataCorp. 2011. Stata Statistical Software: Release 12. College Station, TX: StataCorp LP). To determine how well the estimated parameters fit the data, the Hosmer and Lemeshow's goodness-of-fit test was calculated. The goodness-of-fit specification test reports the deviance statistic and the

Pearson statistic. Chi-square tests are run on each test statistic using the null-hypothesis that the data are Poisson-distributed.

Poisson regression models were estimated using three alternative key independent variables: (1) convenience and grocery stores within 1 mile of a participant's home, (2) convenience and grocery stores within 3 miles of a participant's home, and (3) self-reported perceived access to F&Vs. To determine which model—the GIS 1 mile, GIS 3 mile, or perceived access—was more associated with F&V intake the following tests were used: Akaike Information Criterion (AIC) and McFadden's pseudo R^2 . To further investigate model fit using AIC, the relative likelihood of using one model compared to another was calculated. The relative likelihood estimates the amount of information loss from choosing one model over another. The goal of likelihood estimates is to minimize the amount of information loss. The equation for calculating the likelihood estimate is:

$$\text{Likelihood estimated} = e^{(AIC_{min}-AIC_i)/2}$$

where AIC_{min} is the minimum of the AIC values from the three models and AIC_i is one of the other models. This number generated from this equation is the relative probability that the i th model minimizes information loss.¹²⁷ The model that minimizes information loss with the lowest AIC and highest pseudo R^2 was considered the superior model.

Results

Descriptive statistics for the Green Cart study participants and food outlet data obtained from ReferenceUSA are listed in Tables 3.3 and 3.4. Daily F&V consumptions ranged from 0–12 servings with an average of 4.53 servings per day. Convenience stores outnumbered grocery stores for both 1- and 3-mile buffers around participants' homes. Perceived access ranged from 3 to 15 (3 being extremely high perceived access and 15 being

extremely low perceived access) with an average of 8.21. The majority of participants had a high school degree (71%), received government assistance (63%), were female (90%), and 40 years of age or older (52%). Participants receiving government assistance consumed fewer F&Vs ($p<.01$) and reported less affordable ($p<.05$) and lower quality produce ($p=.10$) within their neighborhoods than participants not on government assistance. Additionally, those receiving government assistance had a higher density of convenience stores within 1 mile of their home than those not on government assistance ($p<.01$).

Exploratory Factor Analysis

Pearson correlation and Cronbach's coefficient alpha were calculated for the four variables: convenience, quality, variety, and affordability of F&Vs. Convenience, quality, and variety all had correlation values of 0.7 or higher, which were statistically significant at the $p=.05$ level. Affordability was weakly associated with the other variables, with a 0.31 correlation value (see Table 3.5). To further examine the four perceived access variables, exploratory factor analysis was conducted. Factor analysis identified one factor (known as "perceived access") with an eigenvalue of 2.71 and accounted for 67.9% of the total variance. One variable, affordability, was considered not significant because its factor loading did not meet the criterion of being greater than 0.6 (see Table 3.6).

Cronbach's alpha for all four variables was 0.82, suggesting that the scale has relatively high internal consistency for group-level measurement (see Table 3.7). However, as Table 3.7 shows, alpha would increase to 0.91 if affordability was removed from the scale. Therefore, based on the evidence from the inter-item correlation matrix, the factor analysis, and the reliability assessment, the three perceived access items (convenience, quality, and variety) were used to form the perceived access scale.

Pairwise Correlation

Pairwise correlation between the perceived access scale and GIS measurements reveals that Green Cart Study participants' perceived access does not align very well with GIS-based measurement (see Table 3.8). Even though perceived access is correlated with convenience stores within 3 miles of a participant's home, it is not significant at the $p=.05$ level and it is weakly correlated with a correlation coefficient of 0.1771. Based on the correlation coefficients and statistical significance, GIS and perceived access are not highly correlated.

Among specific participant populations, pairwise correlations were calculated for participants based on education, age, sex, and receipt of government assistance (see Table 3.9). Although the perceived access measure was weakly correlated in most of the different subpopulations, there were some subpopulations that exhibited statistically significant correlations between perceived access and the GIS measures. In general, participants with more than a high school degree had perceived access measures negatively correlated with convenience stores, suggesting that as the number of convenience stores increased, perceived access decreased. Among participants ages 40 or older, pairwise correlation shows that their perceived access was not correlated with GIS measures. However, among participants younger than age 40, as the number of convenience stores increased, perceived access decreased. Last, perceived access was uncorrelated with GIS measures among participants on government assistance. However, the measures were correlated among those participants not on government assistance, similar to more educated, younger participants.

Poisson Regression Estimates

Based on the two goodness-of-fit test statistics, the null-hypothesis that the data are Poisson distributed was not rejected. Poisson models were run using three alternative key independent variables: (1) convenience and grocery stores within 1 mile of a participant's home, (2) convenience and grocery stores within 3 miles of a participant's home, and (3) self-reported perceived access to F&Vs (see Table 3.10). In the first model, average marginal effect results show that as the number of convenience stores within 1 mile of a participant home increases by one, daily F&V consumption was associated with a lower intake of 0.16 servings per day; however, this was not statistically significant ($p=.107$). Conversely, as the number of grocery stores within 1 mile of a participant's home increases, daily F&V consumption was associated with a higher intake of 0.29 servings per day ($p<.05$). Although education and age were statistically insignificant, receiving government assistance was strongly associated with F&V consumption. On average, having government assistance was associated with a 1.05 serving lower intake in daily F&V intake as well as a 0.53 lower intake in daily fruit intake ($p<.05$) compared to those without government assistance. Being female was statistically significant ($p<.01$) with a lower daily F&V consumption compared to men. On average, females had 2.26 fewer daily F&V servings, 1.13 fewer servings of fruit, and 1.13 fewer servings of vegetables.

In the second model examining food outlets within 3 miles of a participant's home, average marginal effect results show that as the number of convenience stores within 3 miles of a participant increased, it was associated with a 0.055 servings higher intake in daily F&V and 0.042 higher servings of vegetable ($p<.10$). Conversely, as the number of grocery stores within 3 mile of a participant's home increased, daily F&V consumption was lowered by

0.07 servings per day ($p < .05$) and vegetable consumption was lowered by .051 daily servings ($p < .10$). Similar to the first model, education and age were statistically insignificant with F&V consumption. Receiving government assistance was strongly negatively associated with F&V consumption. On average, having government assistance was associated with a 1.24 serving lower intake in daily F&V intake; a 0.57 serving lower intake in daily fruit; and a 0.68 serving lower intake in daily vegetable ($p < .01$). Being female was statistically significant ($p < .01$) with a lower intake in daily F&Vs, fruit, and vegetables ($p < .01$).

In the final model examining the association between perceived access and F&V consumption, average marginal effect results show that increased perceived access was associated with a lower intake of daily F&V; however, this result is statistically insignificant. Similar to models 1 and 2, education and age were not significantly associated with F&V consumption. Receiving government assistance was again strongly negatively associated with F&V consumption. On average, having government assistance was associated with a 1.18 servings lower intake in daily F&V ($p < .05$), as well as a 0.56 serving lower fruit intake and a 0.61 serving lower intake in vegetables ($p < .10$). After conditioning the Poisson regression models on receipt of government assistance to compare group differences, increased perceived access was associated with *lower* F&V intake for those on government assistance, while not receiving government assistance was associated with *higher* F&V intake. However, these findings were insignificant.

Because affordability was insignificant in the perceived access scale Poisson regression models, yet receiving government assistance was highly significant, additional analyses including only affordability as the key independent variable revealed that for participants on government assistance, affordability was associated with higher F&V intake

(see Table 3.11). More specifically, increased perceived affordability was associated with an increase in F&V intake by 0.24 daily servings. Although statistically insignificant, when looking across all groups (all participants, participants on government assistance, and participants not on government assistance) increased affordability was more significant and had a greater impact on daily F&V consumption for participants receiving government assistance.

Model Fit

In terms of model fit, the GIS 1-mile model had an AIC of 491.65 compared to GIS 3-mile model of 492.18 and perceived access model of 494.43. The model with a lower AIC was the preferred model. To further investigate model fit using AIC, the relative likelihood of using one model over another was calculated. The GIS 1-mile model was considered the AIC_{min} and AIC_i were considered the GIS 3-mile and perceived access model. After calculating the relative likelihood using the GIS 1-mile versus the GIS 3-mile model and GIS 1-mile versus the perceived access model, it was determined that the GIS 3-mile model was 0.77 times as probable as the GIS 1-mile model to minimize the information loss and the perceived access model was 0.25 as probable as the GIS 1-mile model to minimize information loss. The GIS 1-mile model had a pseudo R^2 of 0.0694 compared to the GIS 3-mile model's pseudo R^2 of 0.0684 and the perceived access model's pseudo R^2 of 0.064. Therefore, based on lower AIC and higher pseudo R^2 the GIS 1-mile measure had the best model fit.

Discussion

Although some studies show that greater proximity to grocery stores is associated with higher F&V consumption, findings on the relationship between F&V access and

consumption are mixed. In Sallis and Glanz's (2009) systematic review focusing on geographic proximity, they found that the presence of grocery stores or supermarkets in communities was associated with the probability of having a healthier diet.¹¹ However, a longitudinal study involving over 5,000 young adults found that having geographic access to more supermarkets was unrelated to F&V consumption.⁵² The fact that studies using geographic proximity to measure the effect of F&V access on consumption have had mixed results may suggest that living closer to food stores that sell fresh F&V may be necessary, but not sufficient, to improve F&V intake among low-income individuals. Therefore, this study sought to reveal that more comprehensive methodologies are needed to examine the relationship between F&V access and consumption.

Perceived Access Scale

This study's findings support the notion that perceived access can be viewed as a construct with three correlated dimensions related to access: convenience, quality, and variety. Based on the results from Pearson's correlation coefficient, Cronbach's alpha, and exploratory factor analysis, the perceived access scale, without the affordability item, is reliable and valid. Although this study has developed a scale to use self-reported data to measure access, it should be further analyzed in larger studies in different geographic regions.

Pairwise Correlation

Based on this study's results from pairwise correlation, in general, it appears that the perceived access scale is not correlated with GIS measures. However, after controlling for age, education, and income (using government assistance as a proxy for income status), pairwise correlations show that the perceived access model is more highly correlated with

GIS measures for younger, more educated, and higher-income participants. That is, perceived convenience, quality, and variety are more correlated with food outlet type within 1 and 3 miles of the home for some subgroups.

Therefore, it is suggested that GIS measures may better align with self-reported perceived access measures for younger, more educated, and higher-income participants than older, less educated, lower-income participants. This could be due to situational awareness, which involves being aware of one's environment and how one's actions can achieve personal goals or objectives.¹²⁸ Individuals with more situational awareness of their food environment, such as younger, well-educated, and higher-income individuals, may value produce more than older, less educated, and lower-income individuals. For example, if individuals do not value the produce at food outlets near their home, they might drive further distances to food outlets that carry produce they prefer (i.e., higher quality and better variety). Therefore, GIS-based measures and self-report perceived access measures may correlate better than compared to correlation measures for older, less educated, and lower-income individuals. That is, these individuals may not have the same food preferences for fresh F&Vs at better food outlet options due to personal transportation barriers, cost, or time.

Poisson Regression Models

Overall, the Poisson regression models showed that GIS-based measures (food outlets within 1 and 3 miles of a participant's home) had more predictive power than the perceived-access models for estimating the association between F&V access and consumption. Based on model 1, food outlets within 1 mile of a participant's home, increasing the number of grocery stores within a 1-mile radius was associated with higher daily F&V intake. This finding is similar to another study, which found that with each additional supermarket in a

census tract, F&V consumption increased by 32% among African American residents.⁵²

Although only marginally significant ($p=.102$), a higher number of convenience stores within 1 mile of a participants' home was associated with decreased daily F&V consumption. The negative relationship between convenience stores and F&V consumption is consistent with findings from another study that reported presence of convenience stores in the community decreased daily F&V intake by 1.84 servings.¹²⁹

In model 2, food outlets within 3 miles of participants' home, the relationship between food outlets and F&V consumption was reversed—more convenience stores was associated with higher consumption, whereas more grocery stores was associated with decreased consumption. Although the results are surprising, it may suggest that when grocery stores are farther away and less convenient to travel to, low-income individuals choose a more convenient food outlet, such as convenience stores, to do their food shopping. In a qualitative study examining barriers to F&V consumption for low-income individuals in Orange and Durham County, North Carolina, several participants mentioned they purchased fresh F&Vs at convenience stores because they were closer and had better quality than the grocery stores in their community.⁵ However, even for lower-income people, having grocery stores within 1 mile of their neighborhood facilitated consumption. Further analyses of low-income participants receiving government assistance revealed that F&Vs were consumed more when participants lived closer to grocery stores than compared to participants receiving government assistance who lived farther away.

Although the perceived access model had less predictive power for estimating the effect of F&V access on consumption, other studies have shown that convenience, quality, and variety of F&Vs do influence F&V consumption. A quantitative study of 495 residents in

six low income communities in Chicago, Illinois, found that regardless of geographic accessibility, participants who reported higher quality, variety, and convenience had greater F&V consumption than participants who reported lower quality, variety, and convenience.⁵⁴ Because of this study's small sample size, the perceived access scale's predictive power should be tested in larger sample sizes. More importantly, it should be noted that the F&V screener questions asked participants to report on consumption of "*fresh, frozen or canned*" F&Vs whereas the perceived access questions asked participants to report only on access to *fresh* F&Vs. Therefore, it might be reasonable to assume that the Poisson model over-reports fresh F&V consumption (because the measure includes fresh, frozen, and canned), leading to null findings with perceived access measures. Additionally, distance was measured using a straight-line distance between two points, known as the Euclidean distance or "as the crow flies" rather than using the road networks participants would normally use to travel. However, for individuals lacking personal transportation, Euclidean distances or road networks do not take into account public transportation, including bus routes and frequency of buses, therefore underestimating the distance it takes to travel to a food outlet. This may have influenced the perceived convenience of traveling to grocery stores.

Across all models, participants on government assistance consumed fewer F&V than participants not on government assistance. Because government assistance was used as a proxy for household income, this result is consistent with the Behavioral Risk Factor Surveillance System findings that lower-income North Carolinians consume fewer F&Vs than higher-income North Carolinians. From 2000 to 2009, approximately 15% of adults with annual incomes of \$15,000 or less met F&V intake guidelines compared to 30% of adults with annual incomes of more than \$50,000.³

Across all three models, women consumed less F&V than men. This finding may be due to the study's design, as one inclusion criteria for the survey was that individuals had to be responsible for 50% of the food shopping, resulting in 90% of participants being females and only 10% male. Therefore, the 10% of men that did respond to the survey may not be representative of the average male population, resulting in limited generalizability for men. Additionally, in general, men consume more food than women.

Limitations

The small sample size and limited geographic diversity may reduce the generalizability of this study. Because study participants lived only in urban areas, the findings may have looked different if the study were conducted with rural participants. Additionally, the Poisson regression model findings should be interpreted carefully, because the results were very sensitive to the addition or deletion of specific variables. More specifically, the statistical significance of GIS-variables disappeared when several of the variables were isolated. One issue with the GIS variables is that only a random sample (20%) of food outlets were contacted to confirm that they were still operating. Approximately 90% of the food outlets called were currently operating, but this approximation has the potential to change if all food outlets are contacted, thus biasing GIS-based results.

In terms of using the NCI screener to obtain self-reported F&V intake and the Green Cart Survey to obtain perceived access measures, it should be noted that some participants may have not reported accurate estimates. In terms of F&V consumption, participants may have under- or over-estimated consumption (as shown in the NCI validation study of the 17-item F&V screener). Additionally, with the perceived access questions, participants may not have understood the questions. However, researchers tried to mitigate this problem by

conducting cognitive interviews with low-income individuals to ensure they comprehended the survey questions.

Another limitation involving study participants is that the survey was only administered to English-speaking individuals. Therefore, results do not reflect F&V consumption and perceived access for non-English-speaking individuals, who might have different experiences. Last, the Green Cart Study only surveyed individuals that reported interest in purchasing fresh F&V from the Green Cart Program, which has the potential to create participant bias in that those who responded to the survey were more likely to consume fresh F&V.

Policy Implications

Determining which access factors have the strongest association with F&V consumption is important to increasing policymakers' understandings of what types of programs can have the greatest impact on diet and health outcomes. Understanding which factors are more influential for specific groups, specifically lower-income and minority populations, can offer useful guidance for future policies and programs. More importantly, taking into account that presence of food outlets in a community may not be the only factor influencing F&V consumption is important for funders to keep in mind when financing programs to address healthy food access.

This study showed that GIS-based measures had more predictive power for estimating the association between F&V access and consumption than perception-based measures including quality, variety, and convenience. It also suggested that due to situational awareness, younger, more educated, and higher-income participants may be more aware of their food environment surroundings because they value purchasing fresh F&Vs. Therefore,

perceived access measures were better correlated with GIS-based measures for younger, more educated, and higher-income participants. This suggests that using both GIS- and perception-based measures could provide complementary information. For example, although GIS-based measures might have a higher association between F&V access and intake, the perceived access measures might be a signal that other factors such as individuals' food preferences or self-efficacy to cook with fresh F&Vs may also be playing a factor in F&V consumption.

In the past several years, many local and state policymakers have introduced legislation to improve access to healthy food through grocery store development, as well as increasing affordability of fresh F&Vs through food assistance programs for low-income individuals.⁴⁶⁻⁴⁷ This study shows that individuals receiving government assistance live in areas with higher density of convenience stores and that living closer to grocery stores is associated with higher F&V consumption. Based on these results, focusing efforts on improving geographic proximity to healthier food outlets might have a greater impact on F&V consumption for lower-income individuals than addressing perceived access barriers. However, it should be noted that because GIS and perceived access measures were more correlated with educated, higher-income individuals, policymakers might also consider investing in more education-based programs and policies to increase F&V consumption among low-income individuals. Programs should address attitudes toward fresh F&Vs and dietary behaviors of low-income individuals by discussing the health benefits of incorporating fresh F&Vs into diets and menu planning on a limited budget.

Regardless of this study's findings, policymakers and advocates working to improve food access should continue working with researchers to identify specific factors that link F&V access and consumption and determine the direction and magnitude of their association.

TABLES & FIGURES

Figure 3.1: Applying the socio-ecological framework to F&V access and consumption.

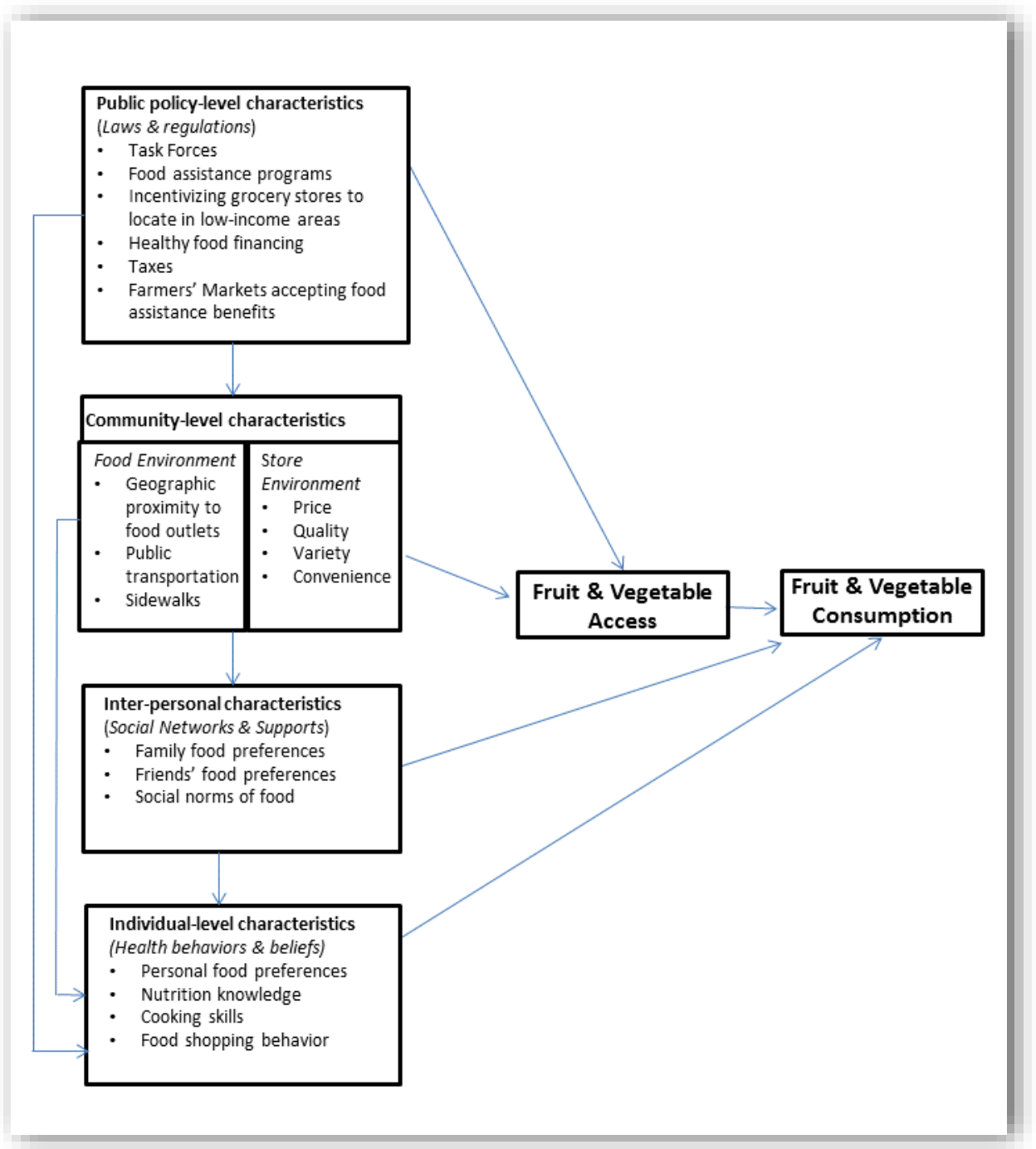


Figure 3.2: Example of 1- and 3-mile buffer around participant home using ArcGIS.

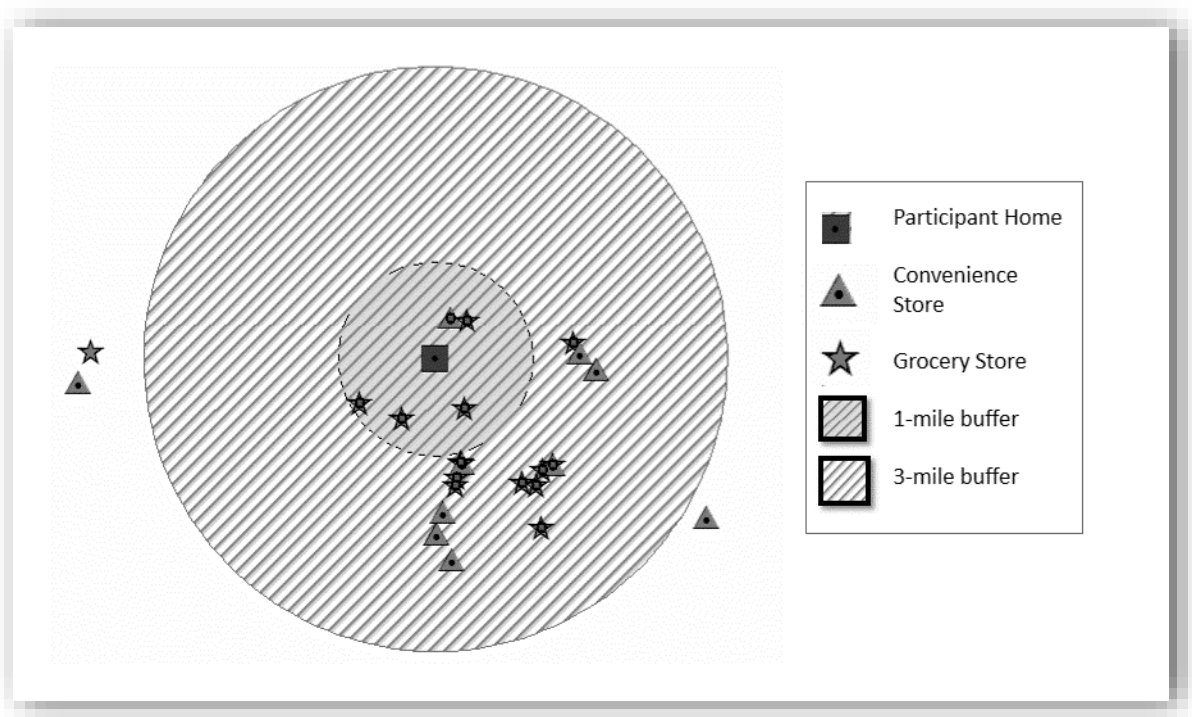


Table 3.1: North America Industry Classification System (NAICS) Codes and Examples of Food Outlets

Industry Group	2012 NAICS Definition	NAICS Index	Example
Supermarkets	Supermarkets and grocery stores primarily engaged in retailing a general line of food, such as canned and frozen foods; fresh fruits and vegetables; and fresh and prepared meats, fish, and poultry. Included in this industry are delicatessen-type establishments primarily engaged in retailing a general line of food.	445110 Supermarkets and Other Grocery (except Convenience) Stores	Food Lion, Kroger, Harris Teeter
Grocery stores	Supermarkets and grocery stores primarily engaged in retailing a general line of food, such as canned and frozen foods; fresh fruits and vegetables; and fresh and prepared meats, fish, and poultry. Included in this industry are delicatessen-type establishments primarily engaged in retailing a general line of food.	445110 Supermarkets and Other Grocery (except Convenience) Stores	Trader Joe's, Weaver Street Market, Food World, Aldi
Convenience stores	Convenience stores or food marts (except those with fuel pumps) primarily engaged in retailing a limited line of goods that generally includes milk, bread, soda, and snacks.	445120 Convenience stores	7-Eleven, Sheetz, Circle K
Convenience stores with gas stations	Establishments engaged in retailing automotive fuels (e.g., diesel fuel, gasohol, gasoline) in combination with convenience store or food mart items. These establishments can either be in a convenience store (i.e., food mart) setting or a gasoline station setting. These establishments may also provide automotive repair services.	447110 Gasoline stations with convenience stores	BP, Shell, Exxon

Table 3.2: Description of Key Variables and Measures

Description	Definition	Type	Source
<i>Dependent Variable</i>			
F&V Consumption	Number of F&V consumed per day (fresh, frozen, or canned)	Continuous	NC Green Carts Program
<i>Key Independent Variables</i>			
Objectively measured F&V access			
Density of supermarkets/grocery stores	Number of supermarkets/grocery stores within 1- and 3-miles from participants' home	Count	ReferenceUSA
Density of convenience stores	Number of convenience stores between within 1- and 3-miles from participants' home	Count	ReferenceUSA
Self-reported F&V access			
Easy to buy fresh F&V	Participant's report of convenience based on 5-point Likert scale	Categorical	NC Green Carts Program
Large variety of F&V	Participant's report of F&V variety based on 5-point Likert scale	Categorical	NC Green Carts Program
High quality F&V	Participant's report of F&V quality based on 5-point Likert scale	Categorical	NC Green Carts Program
Affordability of F&V	Participant's report of F&V affordability based on 5-point Likert scale	Categorical	NC Green Carts Program
<i>Controls</i>			
Gender	Male or female	Binary	NC Green Carts Program
Age	Less than 40 or greater than 40	Binary	NC Green Carts Program
Education level	Less than high school (8 th grade or less; some high school) or more than high school (GED; trade school, some college, college graduate, more than college)	Binary	NC Green Carts Program
Receive government assistance*	Yes/No	Binary	NC Green Carts Program

*Government Assistance includes Supplemental Nutrition Assistant Program (SNAP), Women, Infant, and Children's (WIC) program, Medicaid, Temporary Assistance for Needy Families (TANF), free or reduced school lunch, Head Start, and Social Security Disability Benefits.

Table 3.3: Descriptive Statistics, N=115

Characteristic	Mean	Std. Dev.	Min	Max
Daily F&V intake	4.53	2.38	0	12
Daily fruit intake	2.13	1.33	0	8
Daily vegetable intake	2.39	1.39	0	6
Density of grocery stores <1 mile	1.99	1.72	0	8
Density of convenience stores <1 mile	3.48	2.68	0	13
Density of grocery stores <3 miles	15.69	9.21	0	36
Density of convenience stores <3 miles	19.23	10.92	0	43
Perceived Access	8.21	3.54	3	15
Convenience	2.56	1.29	1	5
Variety	2.71	1.31	1	5
Quality	2.95	1.26	1	6
Affordability	2.69	1.32	1	5
Less than high school degree	0.29	0.45	0	1
Any government assistance	0.63	0.49	0	1
Female	0.90	0.30	0	1
Age 40 or more	0.52	0.50	0	1

Table 3.4: Descriptive Statistics by Receipt of Government Assistance, N=115

Characteristic	Receive Government Assistance (N=72)	No Government Assistance (N=43)	P-Value ^ψ
Daily F&V intake	4.01 (2.02)	5.40 (2.69)	0.0022***
Daily fruit intake	1.92 (1.04)	2.5 (1.65)	0.022**
Daily vegetable intake	2.09 (1.25)	2.90 (1.49)	0.0024***
Density grocery stores <1 mile	2.04 (1.52)	1.90 (2.03)	0.69
Density convenience stores <1 mile	4.04 (2.32)	2.53 (2.99)	0.0031***
Density grocery stores <3 miles	16.54 (9.00)	14.26 (9.47)	0.20
Density convenience stores <3 miles	20.19 (10.18)	17.60 (12.01)	0.22
Perceived Access	8.47 (3.20)	7.80 (4.06)	0.32
Convenience	2.61 (1.24)	2.47 (1.39)	0.56
Variety	2.76 (1.19)	2.62 (1.49)	0.59
Quality	3.09 (1.20)	2.70 (1.34)	0.10*
Affordability	2.88 (1.27)	2.37 (1.36)	0.048**
Less than high school degree	.40 (.49)	.093 (.029)	0.00***
Female	.90 (0.30)	.92 (0.29)	0.94
Age 40 or more	0.54 (0.50)	.49 (0.51)	0.58

Notes: Standard errors listed in parenthesis.

* $p < .10$, ** $p < .05$ *** $p < .01$

^ψ P-value for continuous variable determined using T-test; for dichotomous variable chi² test was used.

Table 3.5: Pearson Correlations for Perceived Access Variables

	Convenience	Variety	Quality
Convenience	1.00		
Variety	0.82*	1.00	
Quality	0.71*	0.75*	1.00

*Significant at the 0.05 level

Table 3.6: Factor Loadings for a 1-Factor Perceived Access Scale

Item	Mean	Standard Deviation	Factor Loading
It is easy to buy fresh fruits and vegetables in my neighborhood	2.56	1.29	0.9007
There is a large selection of fresh fruits and vegetables in my neighborhood	2.71	1.31	0.9185
The fresh fruits and vegetables in my neighborhood are high quality	2.95	1.26	0.8864
I can afford to buy enough fresh fruits and vegetables for my family	2.69	1.32	0.5233

Notes: Bold EFA results indicate the highest factor loading for each item.

Table 3.7: Cronbach's Alpha Correlation

Item	Number of Observations	Sign	Item-test correlation	Item-rest correlation	Average inter-item covariance	Alpha
Convenience	115	+	0.9196	0.8162	1.248055	0.86
Variety	115	+	0.9378	0.8534	1.152098	0.8277
Quality	115	+	0.8928	0.7658	1.389169	0.9015
Test scale					1.263107	0.9053

Table 3.8: Pairwise Correlation between Perceived Access Scale and GIS Measures

	Perceived Access	Convenience Stores <1 Miles	Convenience Stores <3 Miles	Grocery Stores <1 Miles	Grocery Stores <3 Miles
Perceived Access	1.00				
Convenience Stores <1 Miles	0.1415	1.00			
Convenience Stores <3 Miles	0.1771*	0.6536**	1.00		
Grocery Stores <1 Miles	0.1252	0.5692**	0.6376**	1.00	
Grocery Stores <3 Miles	0.0591	0.5226**	0.8238**	0.5203**	1.00

Notes: * $p=.10$, ** $p=.05$

Table 3.9: Pairwise Correlation between Perceived Access and GIS Measures by Specific Participant Populations, N=115

Variable	Convenience Stores <1 Miles	Convenience Stores <3 Miles	Grocery Stores <1 Miles	Grocery Stores <3 Miles
Education				
Less than high school	-0.05	0.051	0.96	-0.16
More than high school	.20*	.21*	0.14	0.14
Age				
Less than 40	0.14	.33*	0.14	0.18
More than 40	0.17	0.0035	0.093	-0.11
Sex				
Female	0.095	0.14	0.10	0.039
Male	0.52	0.5	0.36	0.22
Government Assistance				
No assistance	0.21	.35**	0.17	0.19
Yes Assistance	0.039	0.0084	0.071	-0.061

Notes: * $p=.10$, ** $p=.05$

Table 3.10: Poisson Regression Estimates of Real and Perceived Measures of F&V Access on Consumption, N=115

Model 1: Food Outlets < 1 Mile

<i>Variable</i>	Fruit & Vegetable		Fruit		Vegetable	
	Coefficient	Average Marginal Effect ψ	Coefficient	Average Marginal Effect ψ	Coefficient	Average Marginal Effect ψ
Density of convenience stores < 1 mile	-0.035 (0.021)	-0.16 (0.097)	-0.018 (0.032)	-0.038 (0.067)	-0.049 (0.029)	-0.12 (0.070)
Density of grocery stores < 1 mile	0.065** (0.031)	0.29** (0.14)	0.014 (0.046)	0.03 (0.098)	0.11 (0.041)	0.26 (0.099)
Age 40 or more	0.120 (0.091)	0.53 (0.41)	0.13 (0.13)	0.28 (0.28)	0.103 (0.13)	0.25 (0.30)
Less than high school degree	-0.103 (0.11)	-0.47 (0.50)	-0.0179 (0.16)	-0.038 (0.34)	-0.18 (0.16)	-0.44 (0.37)
Any government assistance	-0.233** (0.097)	-1.05** (0.44)	-0.25* (0.14)	-0.53* (0.30)	-0.22 (0.13)	-0.52 (0.32)
Female	-0.500*** (0.124)	-2.26*** (0.57)	-0.53*** (0.18)	-1.13*** (0.39)	-0.47*** (0.17)	-1.13*** (0.41)

Model 2: Food Outlets < 3 Miles

	Fruit & Vegetable		Fruit		Vegetable	
<i>Variable</i>	Coefficient	Average Marginal Effect ψ	Coefficient	Average Marginal Effect ψ	Coefficient	Average Marginal Effect ψ
Density of convenience stores < 3 miles	0.012*	0.055*	0.0056	0.012	0.018*	0.042*
	(0.007)	(0.032)	(0.01)	(0.022)	(0.0095)	(0.023)
Density of grocery stores < 3 miles	-0.076**	-0.079**	-0.013	-0.028	-0.021*	-0.051*
	(0.089)	(0.040)	(0.013)	(0.028)	(0.012)	(0.029)
Age 40 or less	0.076	0.35	0.11	0.23	0.047	0.11
	(0.089)	(0.40)	(0.13)	(0.28)	(0.012)	(0.29)
Less than high school degree	-0.084	-0.38	0.0049	0.01	-0.17	-0.40
	(0.11)	(0.51)	(0.16)	(0.34)	(0.16)	(0.38)
Any government assistance	-0.28***	-1.24***	-0.26*	-0.57*	-0.28**	-0.68**
	(0.094)	(0.43)	(0.14)	(0.30)	(0.13)	(0.31)
Female	0.488***	-2.21***	-0.5***	-1.07***	-0.48	-1.14***
	(0.13)	(0.58)	(0.18)	(0.40)	(0.17)	(0.42)

Model 3: Perceived Access Measures

	Fruit & Vegetable		Fruit		Vegetable	
<i>Variable</i>	Coefficient	Average Marginal Effect Ψ	Coefficient	Average Marginal Effect Ψ	Coefficient	Average Marginal Effect Ψ
Perceived Access	0.014 (0.013)	0.062 (0.060)	0.012 (0.019)	0.027 (0.041)	0.015 (0.018)	0.035 (0.043)
Affordability	-0.041 (0.036)	-0.18 (0.16)	-0.029 (0.052)	-0.062 (0.11)	-0.051 (0.050)	-0.12 (0.12)
Age 40 or less	0.092 (0.090)	0.41 (0.41)	0.13 (0.13)	0.28 (0.28)	0.057 (0.12)	0.14 (0.30)
Less than high school degree	-0.12 (0.11)	-0.55 (0.50)	-0.030 (0.16)	-0.063 (0.34)	-0.21 (0.16)	-0.49 (0.37)
Any government assistance	0.26** (0.096)	-1.18** (0.44)	-0.26* (0.14)	-0.56* (0.30)	-0.26* (0.13)	-0.61* (0.32)
Female	-0.52*** (0.12)	-2.38*** (0.56)	-0.55*** (0.18)	-1.17*** (0.39)	-0.51*** (0.17)	-1.21*** (0.41)

Note: Standard errors listed in parenthesis.

*p < .10; ** p < .05; *** p < .01

Ψ Delta-method standard errors in parentheses.

Table 3.11: Poisson Results: Average Marginal Effects of Affordability on F&V Intake by Group

Variable	All Participants (N=115)	Government Assistance (n=72)	No Government Assistance (n=43)
Affordability	0.13 (0.15) P-value=0.41	0.24 (0.19) P-value=0.22	-0.10 (.27) P-value=0.72
Less than high school degree	-0.57 (0.50)	-0.43 (0.51)	-1.95 (1.5)
Age 40 or more	0.34 (0.40)	0.13 (0.49)	0.75 (.73)
Female	--2.37*** (0.56)	-2.25*** (0.66)	-2.63 (1.05)
Government assistance	-1.15*** (0.44)	--	--

Note: Standard errors listed in parenthesis.

*p < .10; ** p < .05; *** p < .01

^ψ Delta-method standard errors in parentheses.

CHAPTER 4: STAKEHOLDER ARGUMENTS IN ACCESS TO HEALTHY FOOD STATE-LEVEL LEGISLATION IN NEWSPAPERS AND BILL HEARINGS

Introduction

Obesity is the leading preventable cause of illness and a major contributor to morbidity and mortality in the United States.¹⁷ Consuming healthy foods can help maintain and prevent weight gain and reduce the risk of chronic diseases.¹ Due to its high morbidity and mortality rates and impact on healthcare costs, public health advocates are calling obesity the “new tobacco.”³ Obesity and smoking are also both influenced by similar psychological, social, and environmental factors.⁸⁹ Due to these similarities with tobacco, the framing of arguments used by and against the tobacco industry may help lay the groundwork for framing arguments for legislation regarding access to healthy food.

Framing theory is built on the idea that individuals, groups, and societies view issues from various perspectives. All individuals have preconceived beliefs and values that likely have been a part of their culture for long periods of time. Speaking to these individuals’ core values and beliefs is critical in highlighting and promoting specific issues. Because individuals organize their thoughts and perceive issues differently, framing attempts to influence the way an individual thinks about an issue by selecting certain aspects of an issue to prompt a specific response.⁹³ The overall goal of framing is to influence peoples’ opinions, decisions, and behaviors by appealing to their core values using arguments or facts that they are willing to accept.⁹⁴ The way issues are framed can also influence policy formation.⁹⁴ In the policymaking process, political battles are rarely won using logical and rational

arguments. They are won based on which side can better frame an argument that resonates with public opinion and political will.⁹⁶

The use of framing can be seen in the example of tobacco control, which is one of the most cited and most successful public health movements of the 20th century. The public health community framed the anti-smoking campaign by focusing on appealing to the core values of health, the rights of non-smokers, protection from harm, the David versus Goliath analogy, and truthfulness. Policy makers and public health advocates successfully used these frames to implement tobacco taxes, marketing restrictions, and smoke-free institutions to help reduce smoking rates.⁹⁰ In 1990 only 700 local ordinances across the United States banned smoking in public places. However, in 1998, an important event that jumpstarted social disapproval of the tobacco industry was the U.S. Master Settlement Agreement's release of internal documents from tobacco companies that revealed they manipulated nicotine levels so consumers would become more easily addicted, hid negative scientific data about the harms of smoking, and purposefully marketed smoking to youth.⁸⁸ By 2005, over 25 states had ordinances restricting smoking in public places. As a result of the public health community's efforts, in part, from 1965 to 2011, smoking rates decreased from 42% to 19%.⁸⁵ The tobacco industry responded by defending their products, framing arguments to counteract the anti-smoking campaign from the public health community: promoting individual choice and personal responsibility (liberty), fear of big government, economic security (promoting the economy), and lack of truthfulness (manipulation and deceit of scientific evidence).⁹⁷⁻¹⁰⁰

Because of the similarities between tobacco use and obesity, frames used in the fight against tobacco could be used to promote access to healthy foods or reduce access to

unhealthy food. Several of these frames might include appealing to the core values of health: the food industry being portrayed as a “killer” in that unhealthy foods can cause morbidity and mortality, the food industry impeding personal choice because consumers do not have the information they need from the food industry to make informed choices about food; manipulation and deceit by the food industry to target youth and minorities as consumers for their products, and the public health community protecting the public against the major food industry. In contrast, the food industry might focus on promoting individual choice and personal responsibility, fear of big government, economic security (taxes hurt business and consumers), and lack of truthfulness from the scientific community.

However, it is important to keep in mind that although food is similar to tobacco, there are dissimilarities. Despite the fact that the scientific and medical community can accurately conclude that no health benefits exist for humans consuming tobacco, they cannot claim that for food. Food is a necessary requirement for the human body and existence. Physicians can recommend that their patients stop smoking, but they cannot recommend that they stop eating. Therefore, although there may be similarities between access to healthy food and tobacco frames, there might be different frames used in the food debate that do not mirror the tobacco industry.

To date, most legislative bill content analysis has focused on childhood obesity legislation. Although the methodology for research on adult obesity is similar, research of childhood obesity legislation focuses specifically on school-based nutrition, physical education, and food marketing to children.¹³⁰⁻¹³⁵ Examples of access to healthy food legislation for adults include financing initiatives to increase the sale of fresh produce in underserved communities, allowing farmers’ markets to accept electronic benefit transfer

(EBT) for Supplemental Nutrition Assistance Program (SNAP) recipients, establishing food access task forces, integrating locally grown produce into the marketplace, taxing sugar-sweetened beverages (SSB), and restricting unhealthy foods/drinks purchased with SNAP. To date, there has been little analysis of state-level policy efforts to address access to healthy foods, and no studies have conducted a content analysis of the framing of the legislation. More specifically, no researchers have conducted content analysis of how these bills, and the arguments for and against such legislation, have been framed.

The purpose of this paper is to (1) determine which states have introduced access to healthy food legislation and describe their content and history, and (2) understand the frames that stakeholders have used to support and oppose state-level access to healthy food legislation. Using content analysis, I describe stakeholder arguments used to support or oppose each bill. I hypothesize that the frames used to support and oppose bills will mirror those used in the tobacco fight from the 1950s to the 2000s.

Methods

The Legislative Process

This study includes state legislation including bills and resolutions regarding access to healthy food—financing initiatives to increase the sale of fresh produce in underserved communities, allowing farmers’ markets to accept EBT for SNAP recipients, establishing task forces (such as researching current and future initiatives to address access to healthy foods and conducting community food assessments), integrating locally grown produce into the marketplace, taxing SSBs, and restricting unhealthy foods/drink purchased with SNAP. A bill is a proposed new law or amendment to an existing law, and a resolution is a formal expression of the opinion of one or both chambers of the legislature about a specific public

interest.¹³¹ Bills must be introduced by a legislative member (i.e., sponsor). Once legislation is introduced, it is assigned a legislative number, given a first reading, and referred to an appropriate committee(s). For example, a bill promoting local produce might be sent to the Committee on Agriculture. Once in the appropriate committee, the bill is explained to members, who then debate its strengths and weaknesses. Committees can also hold public hearings in which witnesses can give testimony in support or opposition to the bill, and committees can pass the bill, give the bill an unfavorable report, or postpone it indefinitely.¹³⁶ After approval by a committee, the bill is sent to the body's floor for consideration (e.g., the full body of the House or Senate). If approved, the bill is then sent to the other body for consideration and the procedure is repeated. If both bodies pass the legislation but there are conflicts in the versions passed by each body, it may be referred to a conference committee to work out the differences. If both the House and the Senate approve the same bill, it is sent to the governor. Finally, to become a law, the governor must approve and sign the bill, or if vetoed, both bodies must override the veto.¹³⁶ In contrast, resolutions do not have to be approved by the governor and do not have the same caliber as a law.

Data Sources

Legislative Database. Multiple online sources were used, including the Yale Rudd Center for Food Policy and Obesity's Legislation Database (Legislative Database), state legislatures' Web sites, and InfoTrac Custom Newsstand, to obtain bill information. The Legislative Database was used to identify which states introduced legislation between January 1, 2010, and December 31, 2012. The Legislation Database began tracking food policy legislation filed by federal and state governments in 2012. Because this study began in 2013, only two complete years of legislation were included in the study. The Legislation

Database includes 22 obesity issue areas, including access to healthy foods, food assistance programs, and SSB taxes. From these three categories, bills were further categorized into eight sub-categories: grocery store/supermarket development, promoting local produce, farmers' markets, SSB tax, food assistance program (SNAP/WIC) expansion, food assistance program (SNAP/WIC) restriction, healthy food financing, and task forces.

State Legislature Web sites. State legislature Web sites were used to download bill text, committee hearing transcripts, testimonies, letters of support, and minutes. State legislature Web sites contain information on bill language and history, including status updates, whether a bill has passed or failed, bills enacted into law, and dates for adopting laws. Although all 50 states have bill text available online, only 18 have legislative hearing data (transcripts, testimonies, letters of support, and minutes). The level of data available on the legislative Web sites varies depending on how far a bill traveled in the legislative process. Bills that were referred to specific committees and read multiple times in chamber were more likely to have data available online.

InfoTrac Custom Newsstand. After all available data were downloaded from state legislature Web sites, InfoTrac Custom Newsstand was used to search for newspaper articles and press releases related to each bill. InfoTrac Custom Newsstand is an online search engine database that keeps up-to-date information from over 1,100 major U.S. local, regional, and national newspapers.

Search Strategy and Sample Selection of Legislative Bills and Articles

The Yale Rudd Center for Food Policy and Obesity's Legislative Database identified 214 bills and resolutions introduced from January 1, 2010, to December 31, 2012. Bills were excluded if they focused on school food (n=19), food marketing to children (n=1), eligibility

requirements for food assistance programs (n=4), city ordinances (n=7), bills introduced before 2010 (n=7), a general tax exemption (e.g., exempting certain foods from sales taxes) (n=25), home-rule (e.g., authorizing or restricting municipalities from imposing their own food and beverage taxes) (n=5), voting requirements in legislation (n=2), or a duplicate bill (n=6). After these exclusions, a total of 132 bills and 5 resolutions were selected for this study.

After selecting the final sample of 132 bills and 5 resolutions, state legislature Web sites were used to find hearing data (transcripts, testimonies, letters of support, and minutes) specific to each bill. This search strategy yielded 113 documents: 67 testimonies, 23 bill analyses, 13 sponsors' memos, 6 letters of support, 2 witness lists, and 2 veto messages. After all hearing data were collected, InfoTrac Custom Newsstand was used to find newspaper articles and press releases specific to each bill written between 2010 and 2012. Based on a preliminary search of 30 bills, articles were most likely to be published close to a committee hearing date. However, due the relatively low number of articles published about bills, articles were searched from the date a bill was introduced until it passed or failed to pass.

Headlines and lead paragraphs were searched using 3 different combinations: state name *and* bill number, state name *and* bill title, state name *and* bill topic (using one of the eight bill categories). For states introducing SSB taxes, 3 combinations were used: state name *and* sugar-sweetened beverage tax, state name *and* sweetened beverage tax, and state name *and* soda tax. Articles were excluded if they were duplicates and/or if the article was not predominantly about the bill. This positioned the content analysis to focus on substantive content rather than just brief mentions (i.e., "Next week, the legislature will be discussing SB

264, integrating local produce into grocery stores, on April 24 in Room 201”). This search strategy yielded 206 articles, of which 100 were selected.

Bill Content Analysis

Bill coding was divided into three stages: general bill information (quantitative), stakeholder analysis (qualitative), and bill arguments (qualitative). Table 4.1 highlights the categories of bill information that were analyzed for this study.

General Bill Information (Quantitative). A database was created to include the following information regarding each bill: state of origin; bill number, title, year of introduction, chamber of origin, sponsor, legislative history, amount of time “active,” topic (grocery store/supermarket development, promoting local produce, farmers’ markets, SSB tax, food assistance program (SNAP/WIC) expansion, food assistance program (SNAP/WIC) restriction, healthy food financing, or task force), purpose (to expand or restrict access), strength of language (requires/restricts/mandates or recommends/encourages), funding, oversight of activities, and whether the bill was enacted into law (see Table 4.1). These categories were selected using past research on childhood obesity legislation and additional categories thought to be of interest.^{130,133-135} To improve the study’s rigor, a second coder assisted with coding (DS)^c. The study’s first author, LHM, trained the DS before the coding process began and coders independently coded 20 bills and met to compare results and discuss coding technique to decrease future discrepancies. To assess inter-rater reliability, Krippendorff’s Alpha-Reliability was calculated. Overall percent agreement across the bills was 78.9%. LHM and DS then independently coded the rest of the bills.

^c I am very appreciative of Danielle Schramm’s assistance with coding the newspaper and bill hearing documents.

Stakeholder Analysis (Qualitative). Press releases, newspaper articles, transcripts, testimonies, letters of support, and meeting minutes were uploaded into the qualitative software program Atlas.ti 7.0 (Berlin, Germany). Stakeholders were identified using the documents and divided into two types: bill opponents and bill proponents. Stakeholders were coded as an opponent if they opposed the bill or voted against it; conversely, they were coded as proponents if they supported the bill or voted for it. For each state, opponents and proponents were counted for each bill they opposed or supported.

Bill Arguments (Qualitative). Press releases, newspaper articles, transcripts, testimonies, letters of support, and meeting minutes were analyzed using a general inductive approach to identify how arguments were framed. This is considered an appropriate approach to analysis because it allowed for the capturing of arguments that might have been overlooked if using an established codebook. The codebook for this study was developed through an iterative process. In the initial coding phase, two researchers (LHM and DS) independently applied open coding to 25 of the 213 documents. Researchers compared open codes, reconciled coding discrepancies through discussions, and then merged codes into an initial coding book that was applied to the next 25 documents. During the first phase of coding, codes were added and revised to help reflect and capture the data more appropriately. Researchers discussed the revisions, adapted the initial codebook, and applied the revised codebook to all 213 documents independently for a second cycle of coding. Code discrepancies were discussed and consensus was reached to ensure inter-rater reliability. Fifteen codes were independently applied to 213 documents (see Table 4.2). Once all documents were coded, we determined code frequencies and wrote summary reports for each code.

Results

Quantitative Results

Bill Information. Between 2010 and 2012, 34 states introduced 137 bills relevant to this study, 18 of which were enacted into law (see Table 4.1). Five states introduced approximately half of all bills (see Table 4.2): New York (24 bills), Mississippi (12 bills), California (11), Hawaii (11), and Tennessee (11). California enacted the most bills (3) and Mississippi and Colorado both enacted 2. Among bills that did not pass, approximately 30% were sent to a committee within the first 30 days after being introduced and no further action was taken (see Table 4.3). A majority of the bills recommended or encouraged action (as opposed to mandating action) (72%) and were introduced by a Democrat (78.1%) (Table 4.1). Only 10 bills (7.3%) allocated funding to the bill's activities. Of those allocating funding, three states allocated \$10,000, four states allocated the amount raised by a new tax revenue, two states allocated \$200,000, and one state allocated \$300,000. Thirty-six of the 137 bills assigned an agency to oversee its activities. None of the bills included an evaluation component.

Legislative History. A total of 137 bills were introduced in one of the two legislative bodies and referred to a committee (see Figure 4.1). Of those 137 bills, 49 were heard by the committee. Of the 49 bills heard by the committee, 29 were sent to the floor for consideration. From the 29 bills considered on the floor, 27 were referred to another legislative body, 21 of those were heard in committee. From the 21 heard in committee, 6 passed without amendments and 15 with amendments. For the 15 bills passed with amendments, all were reconciled between both bodies. Among the 21 bills sent to governors, 3 were vetoed and 18 were approved to become law.

Bill Types. Bill types were categorized as either “expanding” access to healthy food or “restricting” access to unhealthy food. Bills were then further categorized into eight topics: farmers’ markets, food assistance program expansion, grocery store/super market development, healthy food financing, promoting local produce, task forces, SSB taxes, and food assistance program restriction (see below for description). Expanding legislation included farmers’ markets, food assistance program expansion, grocery store/super market development, healthy food financing, promoting local produce, and task forces. Restricting legislation included food assistance program restriction and SSB taxes.

1. Farmers’ markets: Supports or finances farmers’ market development and other farmers’ market initiatives such as promoting EBT at farmers’ markets or offering tax exemptions for produce sold at market.
2. Food assistance program expansion: Policies are designed to assist lower-income children, families, and seniors access food, such as implementing state-wide EBT systems for WIC, expanding SNAP programs, and increasing funding for recipients.
3. Grocery store/super market development in food deserts: Grocery store and supermarket development initiatives usually strive to increase the number of full-size grocery stores and supermarkets that serve low-income and rural populations.
4. Healthy food financing: Financing initiatives to encourage communities, businesses, and governments to expand access to healthy food, including offering grants and loans for businesses to sell healthy food in underserved communities.
5. Task forces: Establishes task forces to study access to healthy food issues, including developing local food policies that contribute to local food economies, developing policy recommendations regarding increasing consumer access to nutritious foods, and improving food security for working families.

6. Promoting local produce: Promotes the sale of local produce in the state, by increasing economic opportunities for local food producers and encouraging markets to sell produce harvested close to its geographic location.
7. SSB taxes: Establishes or increases tax on foods with minimal nutritional values, including sugar-sweetened beverages.
8. Food assistance program restriction: Proposes new eligibility guidelines for restricting food and drinks purchases that are covered by SNAP funds, such as restricting recipients from purchasing sodas and sugary snacks.

Bills could be coded as more than one bill category (see Table 4.4). Sugar-sweetened beverage taxes had the highest number of bills with 51 (37.2%). Thirty-four bills (24.8%) financed healthy food initiatives, 30 promoted local produce (22%), 23 created task forces (16.8%), 16 created farmers' markets initiatives (11.7%), 14 created food assistance program expansions (10.2%), 13 introduced food assistance program restrictions (9.5%), and 10 suggested grocery store development (7.3%). Seventy-five bills were expanding and 62 were restricting. Only 18 of the 137 bills were enacted. Of the 18 bills that were passed into law, 17 were expanding legislation.

Qualitative Results

Stakeholders. Seven types of stakeholders were identified: business, coalitions, education, faith-based organizations, government, hospitals, and non-profit organizations. Among those main categories, 14 sub-categories were created. For business: agriculture (e.g., farmers, and produce companies), finance (e.g., banks, economic developers, investment groups), food industry (e.g., food and beverage companies, restaurants), farmers' market, health (e.g., medical associations, public health foundations, and healthcare clinics), retail industry (e.g., supermarkets, convenience stores, and manufacturers); for coalitions: taxpayer

coalition and other political coalition; for government: executive branch and legislative branch; and for non-profit organizations: agriculture, civic organizations (e.g., the Junior League and volunteer groups), finance, food & nutrition (e.g., food banks, hunger organizations, nutrition programs), health, labor unions, and policy. For each type of legislation, stakeholders were categorized as either a proponent or opponent and then assigned a category type and sub-category (see Table 4.7).

Arguments. A total of 13 arguments were identified that were used to support or oppose access to healthy food legislation, seven of which focused on factual arguments and six on value-laden arguments that appealed to individuals' core values and beliefs (see Table 4.5). The eight factual arguments identified were (listed from most frequently cited to least): costs of obesity, continuously increasing obesity rates, bill feasibility and implementation, taxes encouraging healthy behavior, obesity as a multi-faceted health problem, and referencing the fight against the tobacco industry. The six core-value arguments identified were (listed from most frequently cited to least): economic security, fairness, fear of big government, protecting the public's health, truthfulness, personal responsibility, and corporate responsibility (see below for description). Listed below are the type of bills, stakeholders, and arguments used to support or oppose each type of legislation: expanding (enacted and failed) and restricting (enacted and failed). See Table 4.6.

1. Economic security: Mentions investing in the local economy—farmers, jobs, revenue, and tourism—as a benefit of the bill. Talks about revenues generated from taxes and (if applicable) can benefit the state; conversely, can also mention how taxes hurt businesses and industries by reducing profits and possibly reducing workforces as a consequence of the bill.

2. Fairness: Mentions how nutrition/food/food access should be equitable for people of all incomes, races, and backgrounds. May include how healthy food should be a right for everyone, not just higher-income populations. Includes inequality, unequal access, and poverty as they relate to food access, disease prevalence, etc.
3. Fear of big government: Government is interfering with personal lifestyles by regulating behaviors, high taxation, and public spending.
4. Protecting the public's health: Government is interfering with personal lifestyles by regulating behaviors, high taxation, and public spending.
5. Truthfulness: Discusses the lack of scientific evidence for a certain bill and lack of truthfulness in the food industry's advertising to vulnerable populations.
6. Personal responsibility: Overweight and obesity is caused by the irresponsibility of individuals—they are responsible for the foods and beverages they consume.
7. Corporate responsibility: The industry is taking their own actions to address healthy foods and obesity. This can include reducing the number of calories per serving, placing new front-of-the-package labels, and placing “healthier” options in schools.

Expanding Legislation Analysis

Enacted Legislation

Of the 18 bills that were passed into law, 17 were expanding legislation: promoting local produce (n=8), task forces (n=7), healthy food financing (n=5), farmers' market (n=5), food assistance program expansion (n=3), and grocery store development (n=1). Promoting local produce and task forces accounted for nearly 80% of passed expanding legislation. Among the expanding legislation that passed, 90.6% of stakeholders were identified as bill

proponents. Approximately 70% of bill proponents comprised of non-profit organizations and businesses, 37.8% and 31.4%, respectively. Among the non-profit organizations, approximately 65% had missions focusing on food & nutrition (45.8%) or health (20.8%). Among businesses supporting legislation, 65% were either finance-based (35.0%) or agriculture-based (30%).

Among stakeholders opposing legislation, those representing businesses (primarily farmers' markets) were least likely to support bills that required EBTs at farmers' markets. Most people representing farmers' markets opposed these bills because they did not want to have to purchase EBT terminals and pay additional processing fees associated with EBT cards. Among the factual arguments used to oppose these bills, many business representatives discussed feasibility and implementation issues (10.1%) associated with requiring EBT at farmers' markets, including individual vendors operating their own point-of-sale system or having a third-party operate the EBT system at markets.

Among the stakeholder arguments used to support expanding legislation, fairness and economic security were the two most frequently cited supporting value-laden frames, accounting for 66.1% of all frames, 42.8% and 23.3%, respectively. When using the fairness frame, many bill justifications included information on how food access disproportionately affects low-income populations and that access should be equitable for people regardless of socio-economic status. Bill sponsors and supporting non-profit organizations often cited health disparities in lower-income populations regarding childhood and adult obesity rates, diabetes, and other obesity-related chronic diseases. Many bills cited statistics that showed the importance of ensuring that people in poverty have access to fresh fruits and vegetables (F&Vs). In a California bill analysis, legislators wrote that that reason for the bill's purpose

was “*Acknowledging that access to healthy food items is a basic human right and lack of healthy, affordable food options can result in higher levels of obesity and other diet-related disease.*” [P2:60–65].

Promoting economic security was seen across multiple bill types, including grocery store development, healthy food financing, farmers’ markets, promoting local produce, and task forces, as a justification for the bill’s purpose. The rationale listed in the majority of grocery store development and healthy food financing bills was that they would create jobs in many communities. In a New Jersey bill helping supermarkets locate in urban areas, the bill’s sponsor Senator Norcross commented, “*This financing initiative will help supermarket operators open in our urban areas, creating access to fresh and healthy foods for residents where availability is currently limited. It will also help to spur economic development in our urban areas and create much-needed jobs.*” [P16:3]. Additionally, some supporters argued that more healthy food venues would bolster property values and tax revenue for the community. Justifications for promoting local produce and farmers’ markets included the importance of protecting productive farmlands for future generations, investing in the local economy, and promoting tourism. Senator Schwartz of Colorado offered the following comment on his state’s Local Foods Local Jobs Act, “*By empowering Colorado’s small farms and small-business entrepreneurs, this bill will create jobs, strengthen the economy, and promote tourism in our local communities.*” [P7:7].

Failed Legislation

Of the 119 bills that failed to pass, 56 were expanding legislation: healthy food financing (n=29), promoting local produce (n=22), task forces (n=16), farmers’ markets (n=11), food assistance program expansion (n=11), and grocery store development (n=9).

Healthy food financing and promoting local produce accounted for nearly 90% of the failed expanding legislation, 51.7% and 39.2% respectively. Among the expanding legislation that failed, 94% of stakeholders were identified as bill proponents; 75% of all proponents were non-profit organizations and governments, 39.6% and 31.7% respectively. For non-profit organizations, health-related (44.0%), food and nutrition (20.0%), and policy-oriented (16.0%) groups accounted for nearly 80% of all organizations. Opponents of failed expanding legislation were the government and non-profit organizations with an agricultural focus.

For failed expanding legislation, fairness and economic security were the two most frequently cited value-laden frames, accounting for nearly 50% of all frames. Bill sponsors and proponents often cited the factual arguments such as costs of obesity (12.6%), including obesity-related chronic conditions like heart disease, diabetes, and stroke that contribute to the rising healthcare costs, as a justification for legislation expanding access to healthy food. For expanding legislation, the only frames that were used to oppose legislation were personal responsibility, feasibility and implementation, and fear of big government. Several opponents criticized the government for offering food assistance programs, stating that individuals have become too reliant on them. Many bill opponents questioned the feasibility of passing and implementing certain laws. For bills transitioning SNAP benefits from a paper-based to EBT, several policymakers discussed the technical difficulties and costs associated with such large transition.

Restricting Legislation Analysis

Enacted Legislation

Only one restricting bill was enacted into law: Colorado's House Bill 1191, the elimination of soda sales tax exemptions. Prior to the passage of this bill, soda was exempt from sales and use tax; however, after implementation Colorado imposed a 2.9% sales tax on soda. Approximately 75% of stakeholders were identified as bill proponents; 50% which were non-profit organizations and the government, 42.9% and 28.50% respectively. Among the non-profit organizations, two-thirds were health-related and one-third policy-related. The only opponents were Republican legislators, who deemed the bill unconstitutional. The main frame used to support the bill was promoting the idea that the bill would generate much needed revenue in the state's economic downturn (economic security). As Governor Ritter commented, Colorado's citizens must, *"work together as stubborn stewards of taxpayer dollars to adjust, adapt and succeed."* However, opponents of the bill argued also made economic security counterarguments. They argued that implementing a soda tax would only threaten the state's economic security by hurting business and consumers. As Senator Jon Penry questioned, *"Do we want a one-party Democratic monopoly that views tax increases as the solution for every challenge that confronts us, or do we want balanced leadership who will cut spending across the board instead of kicking businesses and families when times are tough enough?"* Several opponents also questioned the feasibility of implementing the new tax and which drinks would be defined as "soda" in the tax code.

Failed Legislation

Among the four categories of legislation types, failed restricting legislation was the largest category. Between 2010 and 2012, 63 bills were introduced but not enacted into law.

Sugar-sweetened beverage tax bills (n=50) accounted for nearly 80% of all failed restricting legislation. Thirteen bills focused on restricting food and drink purchases for food assistance program recipients. Failed restricting bills also had the greatest number of stakeholders—proponents and opponents—than any other legislation type category. Approximately 63% of all stakeholders were proponents, including non-profit organizations (26.7%) and governments (16.9%). A majority of the non-profit organizations were health-related (86.8%). Among bill opponents, businesses accounted for 26.1% of all stakeholders. Sugar-sweetened beverage taxes were opposed by both small businesses and large corporations and ranged from distributors to bottlers and store managers. Among the businesses, over 90% were from either the retail or food industry, 54.1% and 37.8%, respectively.

For restricting legislation, the costs of obesity and taxes to encourage healthier behavior were the most popular factual arguments. SSB taxes were seen as a way to encourage healthier behaviors by influencing consumer behavior and decreasing SSB consumption. Bill proponents often cited the effectiveness of tobacco taxes to reduce smoking rates in an attempt to demonstrate the merit of SSB taxes in encouraging healthy behavior (i.e., discouraging consumption). During testimony for the proposed Kansas SSB tax, a non-profit organization discussed how SSB taxes could be effective in targeting adolescents, because they are more price sensitive than adults, *“As in increases on cigarettes there was a decline especially with the young smoker so there might be the same value in relation to soda pop.”* [P123:2303–2450].

In terms of value-laden frames, economic security was the most frequently cited. Proponents argued that taxes could support revenue directed at initiatives aimed to reduce obesity. In addition to generating state revenue, many politicians and advocates trying to

promote bills stated that it was in the best interest for children—that states should protect them from unhealthy food and obesity to promote healthful lives as they age (protecting the public’s health). As Assemblyman Bill Monning from California said in response to a sugary drink tax, *“The long term health of California’s children is at risk and we must work together to avoid a future influx of chronically-ill adults into our already overstressed healthcare system.”* [P34:4] In another California soda tax bill, Senate Majority Leader Dean Florez commented, *“When Michelle Obama introduced her children’s health initiative last week she explained that our children didn’t do this to themselves. They didn’t create an environment where high sugar sodas are the cheapest, easiest drink to find. We did that to them. So we have a responsibility to fix it. And this bill is the right way to start.”* [P38:17–18]. Senator Florez also said in a press conference, *“I don’t want obesity to be the legacy that we leave to our children.”* [P36:8]

Several bill proponents discussed the lack of truthfulness in the other sides’ arguments. Many SSB tax proponents discussed the soda and food industry’s marketing tactics to children and minorities, as well as the issue of donations from these companies to schools and other non-profits. As one press release criticized, *“They defend themselves by increasing their giveaways to community programs, buying full-page ads that celebrate their hypocritical call for moderate consumption and spending \$500 million a year to market to our kids. No other food category in the nation so aggressively markets to children, and yet the soda giants continue to tell us they are champions for health.”* [P35:21].

Although proponents focused mainly on factual arguments as the basis for restricting bills, opponents focused heavily on value-laden arguments such as economic security, fear of big government, corporate responsibility, and personal responsibility. Many businesses

argued that SSB taxes would harm the beverage industry, which is a major employer in many states. Taxes would be passed on to consumers in the form of higher prices, which would decrease consumption and profit margins, depress earnings, and adversely affect employment. Several labor unions were especially worried about the effect of a SSB tax on their truck drivers and manufacturing workers. For some cities located on state borders, many business owners worried that taxes would negatively impact their sales by causing consumers to cross state borders to purchase cheaper products. As one Senator from Vermont said, *“I think we understand very easily that the fact that Vermont is not an island and whatever we decide to do in Vermont really has to make an impact in terms of tax policy in terms of businesses and the fact that we have such a large border with both New Hampshire, New York and Massachusetts.”* [P172:7].

Many opponents also mentioned that implementing SSB taxes during an economic recession would not be helpful for consumers who are just trying to get by and pay their bills. In bill hearings and testimonies, many citizens were worried about how SSB taxes would affect their personal finances through higher prices and job loss. Some opponents appealed to the fairness core value because they felt that SSB taxes would disproportionately affect lower- to middle-income consumers. As Teresa Casazza, President of California Taxpayers’ Association commented, *“Families cannot afford another tax at a time when they are already struggling to make ends meet, especially one that is regressive and discriminatory.”*[P40:6].

Fear of big government was a frame that was used specifically in bills regulating food choice—SSB taxes and food restrictions for SNAP recipients. Many bill opponents said they were against bills regulating food choices due to their paternalistic nature; that is, the bill would limit personal choice, freedom, or liberty. One Hawaii mother opposing SSB taxes

said in her testimony, *“I teach my children at home, where they should be taught, how to eat the right way...I think that the government’s role is not within our lifestyle, to begin taxing us on our lifestyle, or to be interpreting our lifestyle and telling us how to live.”* [P53:29–30].

Similarly, in Kansas, representatives of Treat American Food Services argued in their testimony against a SSB tax, *“Residents of Kansas don’t like it when our government officials use taxation to tell them what to eat and drink, even if we might agree there is a problem. Obesity should be managed by the decisions a person makes relating to overall diet and exercise, not by government or taxes.”* [P126:20]

In response to SSB tax proposals and the allegations about the link between SSBs and obesity, many soda corporations touted that the soda industry was voluntarily taking their own actions to address the obesity epidemic (corporate responsibility). Multiple times, corporations said they were doing their part to address obesity by voluntarily reducing the amount of calories in soft drinks and offering lower-calorie alternatives. Corporations also mentioned supporting new calorie labeling initiatives including the National School Beverage Guidelines in which the soda industry removed full-calorie soft drinks from schools and replaced them with lower-calorie beverage choices. As the American Beverage Association said, *“We are producing fewer total beverage calories for the marketplace through the innovation of more zero- and low-calorie beverages. From 1998-2008, industry cut the total beverage calories it brought to market by 21 percent.”*

Multiple corporations mentioned that the beverage industry was teaming up with First Lady Michelle Obama’s “Let’s Move” anti-obesity campaign. As Coca Cola commented, *“Coca Cola is supporting Michelle Obama’s “Let’s Move” campaign and front of the package labeling, “We’re for transparency, as the first beverage company to commit that*

nearly all our packages will have calories displayed on the front label.” [P136:14–17].

Additionally, they also talked about their own exercise initiatives, including the “think, drink, move” campaign. Another initiative by the beverage industry is the “Clear on Calories,” which put nutrition labels on the front of the drink so consumers can see it before they make their purchases.

Lack of scientific evidence was used by the food industry to support their arguments that SSBs were not linked to obesity and taxes will not decrease consumption. The American Beverage Association, which represents soft-drink makers, bottlers, and distributors, in bill hearings and press releases repeatedly challenged the argument that consumption of sugary drinks leads to obesity. When discussing obesity, the food and beverage industry often referenced peer-reviewed studies that showed that low physical activity level, not SSBs, was the main contributor to rising obesity rates. Additionally, the food industry cited the inverse relationship between the history of soft drink consumption and obesity rates: “*Sales of regular soft drinks have declined year-over-year by 12 percent from 2000 to 2009, according to Beverage Digest. Adult and childhood obesity rates continue to rise across the country during that same period, according to the Centers for Disease Control and Prevention.*” Further, many SSB tax opponents also questioned whether SSB taxes would even decrease consumption.

Personal responsibility was most likely to be referenced in opposition to SSB tax bills than any other bill type. One California SSB tax bill failed because committee members felt that SSB consumption was the individual’s responsibility, not the government: “*Committee members said the issue of product consumption was one of parental and individual responsibility.*” [P34:5]. A father and emergency room physician commented, “*We are*

certainly seeing serious increases in obesity in society for many reasons. But the father in me does tend to think that we need to be more personally responsible as citizens.” [P53:39–40].

The soda industry argued that *“decisions about consumption of sugary drinks are a matter of individual responsibility and parental authority.”* [P43:13].

Opponents of restricting legislation focused on two factual arguments: feasibility/implementation and obesity as a multi-faceted issue. For SSB tax bills, many opponents questioned how the products would be taxed (i.e., by size, by grams of sugar, or by unit), and they noted that tax codes would need to be revised. Additionally, opponents argued that one of the consequences of implementing SSB taxes would be the replacement of products with similar products, or substitute goods such as fruit juices, energy drinks, or sports drinks. Substituting goods could reduce the effectiveness of using tax laws to decrease SSB consumption. For bills restricting SNAP-eligible foods, most opponents discussed issues of state versus federal jurisdiction and that states have no authority to change federal laws. Currently, SNAP food regulations are dictated by federal statutes and states seeking to change this must receive permission from the federal government before passing laws that are inconsistent with federal statutes. To enforce new restrictions on SNAP purchases, the California Grocers Association wrote in an opposition letter to the California legislator: *“It is nearly impossible to identify, evaluate and track the nutritional profile of (every) beverage, or beverage product, for purchase in the ever-changing marketplace.”* [P50:24–27].

Although proponents of SSB taxes argued that obesity rates were the result of increases in SSB consumption, the food industry argued that obesity was a multi-faceted problem. As David Thorp, President of the American Beverage Association, said in his press release, *“If we really want to have a significant effect on the state’s obesity rates, we need to*

look at comprehensive solutions that will have a meaningful and lasting impact on our citizens, not simplistic approaches targeting one portion of the items in our grocery cart for restrictions or taxation. A beverage tax unfairly lays the blame for obesity on the consumption of one particular product.” [P56:16]

Discussion

This study is the first to systematically identify state-level policy efforts to address access to healthy food. Understanding bill characteristics and arguments that are associated with adoption may help researchers and policymakers in understanding factors that are associated with successful bill passage.

This study shows that the majority of bills being introduced have a relatively short bill life and do not go far into the legislative process. Additionally, certain bills types and topics are more likely to pass than others. Bills that expand access to healthy food (n=17) rather than restrict access (n=1) have a better chance of being enacted, most likely because they are less controversial and have more supporters. Bills that restrict personal choice and raise taxes are controversial and more likely to face political opposition and are usually unpopular. Additionally, bills that are supported by various stakeholders are easier to pass than bills that are highly opposed. Bills that passed had 10 times the number of proponents than opponents. Bills that promoted local produce (n=8), created task forces (n=7), supported farmers' markets initiatives (n=5), and promoted healthy food financing (n=5) were more likely to pass than food assistance program expansions (n=3), grocery store development (n=1), and SSB taxes (n=1). It may be that bills requiring few resources (with respect to time and money) are easier to pass than resource-intensive bills. A study focusing on predictors of childhood obesity legislation enactment found that bills that did not require funding, such as

Safe Routes to School or nutrition and physical education curriculum changes, were easier to pass than revenue-restricting bills.¹³⁵

Among expanding and restricting bills, value-laden arguments appeared to carry more influence than fact-based arguments on whether bills passed or failed (see Figure 4.2). For enacted expanding and restricting legislation, approximately 75% and 100% of the supporting arguments appealed to individuals' core values, respectively. For failed expanding and restricting legislation, supporters focused more evenly on factual and value-laden arguments. This could lead to the conclusion that bills that resonate with individuals' core values are more likely to pass than bills whose arguments focus on facts or statistics such as obesity rates and rising healthcare costs. Among the value-laden arguments, economic security and fairness seemed to be the most popular frames used among proponents and opponents. For enacted legislation, approximately 80% of the supporting arguments used were economic security and fairness, 43.9% and 42.8%, respectively. Conversely, among the failed restricting legislation (the largest bill category among all bill types), economic security was the predominant frame used by stakeholders to oppose either SSB taxes or food assistance program restrictions. One interesting aspect of the economic security and fairness frame was that among failed expanding legislation, even when 50% of the arguments were used to support the bills, the bills still did not pass. This could be attributed to the type of stakeholder and that some stakeholders, such as businesses, have more sway than others.

For enacted legislation, non-profit organizations, businesses, and government were the largest proponents. Among the businesses supporting enacted legislation, approximately 80% were financially, agriculturally, or retail-affiliated—all of which are large, well-established industries. Opposing businesses consisted mostly of farmers' markets (91.7%),

which are smaller and possibly less established organizations. However, when larger businesses opposed legislation such as SSB taxes and food assistance restrictions, bills were less likely to pass. Among restricting legislation that failed to pass, opposing businesses consisted of approximately 50% from the retail industry, 40% from the food industry, and 10% from the finance industry. One potential explanation could be that businesses, especially large, well-established industries, have more resources and networks to publicly oppose legislation than smaller businesses, governments, and non-profit organizations. In general, businesses are more likely to appeal to individuals' core values—economic security, fear of big government, personal responsibility, truthfulness, and corporate responsibility than government or non-profit organizations.

Sugar-sweetened beverage taxes and restricting certain SNAP-eligible food items were vehemently contested by businesses such as the beverage and retail industry, because it has the potential to decrease their sales. A study examining patterns of childhood obesity prevention legislation in the United States also found similar findings. Between 2003 and 2005, researchers found that bills that were more revenue restricting, such as vending machine restrictions in schools, were less likely to be enacted into law than task forces, walking and biking paths, and physical education classes.¹³⁰ Another study focusing on predictors of childhood obesity legislation enactment found that menu labeling and SSB taxes were highly opposed and had little success in the legislature.¹³⁵

Just as with the tobacco fight, the food industry used core values such as the fear of big government, economic security, truthfulness, and personal responsibility to successfully oppose food legislation bills. However, one different frame used in the food debate that did not mirror the tobacco frames is the public health value-laden argument legislation fairness.

Although fairness was one of the public health community's most prevalent value-laden arguments, a study examining attitudes about childhood obesity policy found that messages focusing on racial/ethnic and socio-economic disparities as a reason for government action were viewed as weak justifications.¹³⁷ However, the study did find that obesity-related healthcare costs were a justifiable reason for government action among moderate and liberals.

Two factors that were important in passing anti-tobacco legislation were a strong scientific base about the health consequences of tobacco and growing social disapproval of tobacco companies, ignited by internal documents that revealed manipulation of nicotine, hidden data about smoking harms, and targeted advertising to youth,⁸⁸ all of which helped pull attention away from the tobacco industry's personal responsibility frame. Although the food industry has not received the same level of negative attention that the tobacco industry has, there have been several events that received negative public attention. In 2009 and 2010, the Federal Trade Commission filed complaints against the Kellogg Company for making false and misleading claims on children's cereal boxes that claimed the cereals would improve children's attentiveness by almost 20% and helped boost immunity (see Figure 4.3). Additionally, new food studies are now showing the negative health consequences and addictive properties of sugar.¹³⁸

Because appealing to individuals' core values is more effective than using fact-based arguments, policymakers should take advantage of emerging scientific evidence showing the addictive properties of sugar as well as litigation revealing the food industry intentionally targeting their advertisements to youth and minorities, thus negating the industry's frames to

promote individual choice and personal responsibility. Capitalizing on these frames may reduce public support for the food industry and certain unhealthy products.

Limitations

Four limitations exist in this study. First, identifying bills for this study was based on the Yale Rudd Center for Food Policy and Obesity's Legislation Database. Although the database does contain a comprehensive list of bills based on various bill topics, some bills may have been missed or incorrectly categorized under a bill topic. Therefore, this study might not include all access to healthy food bills introduced between 2010 and 2012. Second, the newspaper articles and press release data used for the content analysis depend solely on the articles found via InfoTrac Custom Newsstand. Although this database catalogs a vast number of articles, it does not cover all newspapers across the United States. Therefore, during the search for articles, InfoTrac Custom Newsstand may have missed articles pertaining to certain bills. Additionally, this study did not take into account preemption laws, which is an issue that has arisen in several states. Preemptive laws can prohibit local governments from passing restricting legislation, such as taxing SSBs or regulating the drink size or location of where SSBs or snacks are sold. It is possible that different stakeholder groups and/or different messages may have been used in preemption legislation than in other healthy food state legislation. Third, legislative data from committee meetings, bill hearings, and testimonies depends on information available from state legislative Web sites. Not all states upload this information to their Web sites, so this analysis is only based on information from states that provide publicly available online access to meetings, hearings, and testimonies. Therefore, it should be noted that this content analysis does not contain an exhaustive list of all documents relating to meeting minutes and hearings. Last, this study

does not examine legislation that was introduced before 2010 and after 2012; therefore, research findings can only be based on this study period. Future research should look at years before and after the study period to obtain a more accurate picture of access to healthy food legislation.

Policy Implications and Conclusion

During the fight against the tobacco industry, policymakers and public health advocates learned that business and industries had the most power and resources at the state and federal levels. Therefore, policymakers and public health advocates first implemented tobacco control policies at the local level and only after strong public support did they advance statewide. Considering the 15% adoption rate of access to healthy food state-level legislation, policymakers and public health advocates involved should consider working first at the local level until public support is sustained and policies become institutionalized.

During the fight against the tobacco industry, early tobacco-control legislation failed because the industry marketed their public messages effectively—framing arguments to suggest that smoking was about individual choice and personal responsibility. However, after publicizing the tobacco industry’s manipulation of nicotine levels, the harms of secondhand smoke, and intentional advertising to youth,⁸⁸ public support for smoking decreased and policymakers seized the opportunity to successfully enact tobacco-control legislation. Based on this study, access to healthy food legislation is still in the early stages, where the food industry is using similar value-laden arguments about individual choice and personal responsibility.

The way a public health issue is framed affects public opinion, individual behavior, and policy formation.⁹⁴ This study shows that appealing to individual’s core values is a more

successful tactic than using fact-based arguments. However, it must also be noted that the stakeholder appealing to core values also has an impact on a bill's success or failure.

Although businesses did not play a huge role in most of the types of legislation (passed expanding, passed restricting, and failed expanding), they appeared to have a large influence in the failed restricting legislation. Equally important, businesses relied successfully on value-laden messages appealing to individuals' personal liberties and to personal responsibility. Therefore, policymakers and advocates should counteract the food industry's messages with other value-laden messages such as economic security, protecting the public's health, and individuals' rights to healthy food. Value-laden messages should be tested to see which are most effective in changing public opinion about the food industry.

FIGURES AND TABLES

Table 4.1: General Bill Information, 2010–2012

Variable	Description	Number (Percent)
<i>General Bill Information</i>		
Year introduced	The year a bill was introduced	
2010		44 (32.11)
2011		69 (50.36)
2012		24 (17.52)
Bill sponsor	Party that sponsors the bill	
Democrat		107 (78.1)
Republican		24 (17.52)
Independent		4 (2.92)
Not Applicable		2 (1.46)
Bill life (<i>mean, range</i>)	Number months bill was active	4.84 (0-23)
Bill Purpose		
Restrict choice		62 (45.26)
Expand choice		75 (54.74)
Mandatory versus voluntary action	Bill requires (mandates), or recommends (encourages) action	
Requires/Mandates		72 (52.55)
Recommend/encourage		65 (47.45)
Provides funding	Whether the bill includes provisions for funding	
Yes		10 (7.30)
No		127 (92.70)
If funding provided, amount listed		
\$10,000		3 (2.19)
\$200,000		2 (1.46)
\$300,000		1 (0.73)
Amount raised by tax		4 (2.91)
Oversight	Whether the bill delegates an agency to oversee or enforce the activities	
Yes		36 (26.1)
No		102 (73.9)
Bill status	Whether the bill was enacted into law or failed	
Enacted		18 (13.0)
Failed		119 (87.0)

*Nebraska has a unicameral state legislature, therefore all bills are introduced from the same chamber

Table 4.2: States introducing legislation, 2010–2012, N= 137

State	Number Bills Introduced	Number Bills Adopted	Total
Arizona	2	0	2
California	8	3	11
Colorado	1	2	3
Connecticut	2	1	3
Florida	2	0	2
Hawaii	11	0	11
Illinois	6	0	6
Indiana	1	0	1
Kansas	1	0	1
Kentucky	0	1	1
Louisiana	0	1	1
Maine	1	0	1
Maryland	2	0	2
Massachusetts	0	1	1
Michigan	1	1	2
Mississippi	10	2	12
Missouri	2	0	2
Montana	0	1	1
Nebraska	5	0	5
New Jersey	0	1	1
New Mexico	2	0	2
New York	23	1	24
North Carolina	3	1	4
Ohio	1	0	1
Oklahoma	3	1	4
Oregon	2	0	2
Pennsylvania	1	0	1
Rhode Island	6	0	6
Tennessee	10	0	10
Texas	6	0	6
Vermont	5	0	5
Virginia	0	1	1
Washington	1	0	1
West Virginia	1	0	1
Total	119	18	137

Table 4.3: Bill Life among Bills that Did Not Pass, 2010-2012, N=119

Number of Months	Number of Bills	Percent
0	38	31.9
1	13	10.9
2	12	10.1
3	12	10.1
4	6	5.0
5	3	2.5
6	3	2.5
7	3	2.5
8	1	0.8
9	2	1.7
11	4	3.4
12	12	10.1
15	1	0.8
17	2	1.7
18	2	1.7
23	5	4.2
Total	119	100

Figure 4.1: Typical process for bills introduced, 2010–2012.

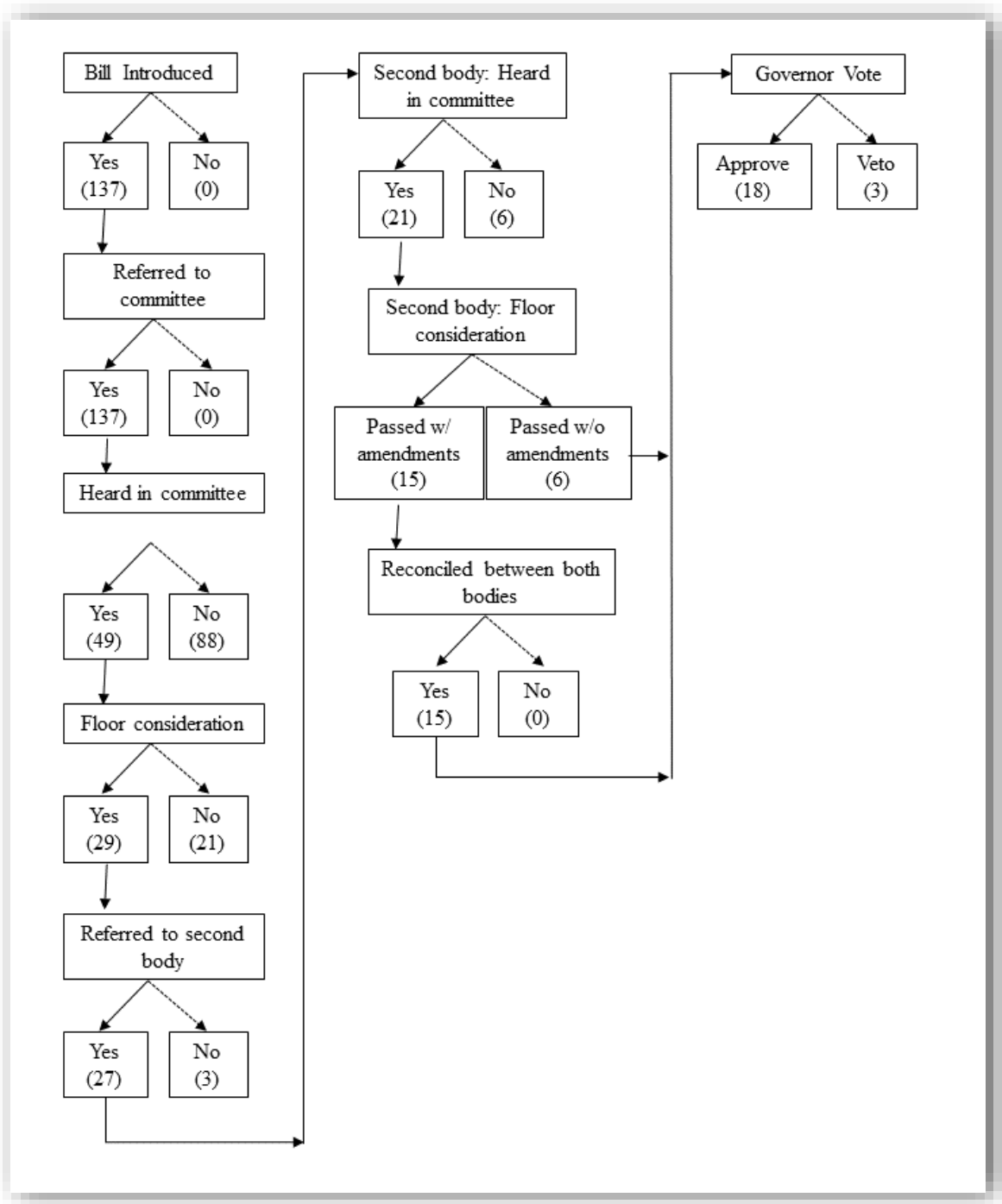


Table 4.4: Topics of Bill Introduced, 2010–2012

Legislation Type	Topic	Definition	Number Bills Introduced (Percent)	Number Bills Adopted (Percent)
Expanding	Farmers' markets	Supports or finances farmers' market development and other farmers' market initiatives such as promoting EBT at farmers' markets or offering tax exemptions for produce sold at market.	16 (11.68)	5 (3.6)
	Food assistance program (SNAP/WIC) expansion	These policies are designed to assist lower-income children, families, and seniors access food, such as implementing state-wide EBT systems for WIC, expanding SNAP programs, and increasing funding for recipients.	14 (10.22)	3 (2.2)
	Grocery store & supermarket development	Grocery store and supermarket development initiatives usually strive to increase the number of full size grocery stores and supermarkets that serve low-income and rural populations	10 (7.3)	1 (0.7)
	Healthy food financing	Financing initiatives to encourage communities, businesses, and governments to expand access to healthy food, including offering grants and loans for businesses to sell healthy food in underserved communities.	34 (24.82)	5 (3.6)
	Task forces	Establishes task forces to study access to healthy food issues, including developing local food policies that contribute to local food economies; developing policy recommendations regarding increasing consumer access to nutritious foods, and improving food security for working families.	23 (16.79)	7 (5.1)
	Promoting local produce	Promotes the sale of local produce in the state, such as increasing economic opportunities for local food producers, and encourage markets to sell produce harvested close to its geographic location.	30 (21.9)	8 (5.8)
	Sugar-sweetened beverage tax	Establishes or increases tax on foods with minimal nutritional	51 (37.23)	1 (0.7)

Restricting		values, including sugar-sweetened beverages.		
	Food assistance program (SNAP/WIC) restrictions	Proposes new eligibility guidelines for restricting food and drinks purchases that are covered by SNAP funds, such as restricting recipients from purchasing sodas and sugary snacks.	13 (9.49)	0 (0.0)

Table 4.5: Codebook and Code Frequency

Code	Definition	Frequency*
<i>Factual Arguments</i>		
Costs of obesity	Obesity causes chronic-related diseases and increases healthcare costs.	177
Obesity rates	Mentions statewide increasing obesity rates among adults, children, or both.	73
Feasibility & implementation	Discusses the feasibility of passing and implementing certain laws. This includes logistics, technological requirements having to electronicize the SNAP/WIC/EBT system, or changing tax laws for sugar-sweetened beverages	66
Taxes encourage healthy behavior	Taxes on unhealthy products encourage healthier lifestyle choices.	60
Obesity is a multi-faceted problem	Many factors contribute to obesity-related health problems. Singling out one particular issue won't help in a problem as complex as obesity.	30
Tobacco fight	Mentions how the arguments that were used against the Tobacco Industry in the Tobacco Fight are similar to the fight against the Food Industry and obesity legislation; also cites the effectiveness of cigarette taxes to reduce smoking rates.	25
<i>Value-laden arguments</i>		
Economic security	Mentions investing in the local economy – farmers, jobs, revenue, and tourism -- as a benefit of the bill. Talks about revenues generated from taxes and (if applicable) can benefit the state; conversely, can also mention how taxes hurt businesses and industries by reducing profits and possibly reducing workforces as a consequence of the bill.	240
Fairness	Mentions how nutrition/food/food access should be equitable for people of all incomes, races, and backgrounds. May include how healthy food should be a right for everyone, not just higher-income populations. Includes inequality, unequal access and poverty as they relate to food access, disease prevalence, etc.	145
Fear of big government	Government is interfering with personal lifestyles by regulating behaviors, high taxation, and public spending.	36
Protecting the Public's Health	The public health community is protecting the health of individuals, families, and children health from unhealthy food and obesity	32
Truthfulness	Discusses the lack of scientific evidence for a certain bill and lack of truthfulness in the Food Industry's advertising to vulnerable populations.	27
Personal responsibility	Overweight and obesity is caused by the irresponsibility of individuals -- they are responsible for the foods and beverages they consume.	23
Corporate responsibility	The industry is taking their own actions to address healthy foods and obesity. This can include reducing the number of calories per serving, placing new front-of-the-package labels, and placing "healthier" options in schools.	17

*Note: Frequency is calculated based on the number of times each document (articles, press releases, hearing transcripts and testimonies) mentions the code.

Table 4.6: Access to Healthy Food State-Level Bills Introduced, Stakeholders, and Arguments, 2010–2012 (N=137)

ENACTED LEGISLATION	EXPANDING LEGISLATION	RESTRICTING LEGISLATION
Total # Bills	17	1
Type of Bill (#/%)		
Farmers' market	5 (27.7%)	--
SNAP/WIC Expansion	3 (16.7%)	--
Grocery store Development	1 (5.6%)	--
Healthy food financing	5 (27.7%)	--
Task forces	7 (38.9%)	--
Promoting local produce	8 (44.4%)	--
SSB Taxes	--	1 (5.6%)
SNAP Restriction	--	0 (0.0%)
Stakeholders (#)	127 (proponents & opponents)	7 (proponents & opponents)
Proponent #/(%)	Non-profit: 48 (37.8%) <ul style="list-style-type: none"> • Food & Nutrition: 22 (45.8%) • Health: 10 (20.8%) • Civic: 6 (12.5%) • Policy: 5 (10.4%) • Agriculture: 3 (6.3%) • Finance: 2 (4.2%) • Labor Union: 1 (0.8%) Business: 40 (31.4%) <ul style="list-style-type: none"> • Finance: 14 (35.0%) • Agriculture: 12 (30.0%) • Farmers Markets: 4 (10.0%) • Retail: 7 (17.5%) • Health: 2 (5.0%) Government: 15 (11.8%) <ul style="list-style-type: none"> • Executive Branch: 8 (53.3%) • Legislative Branch: 7 (46.7%) Faith-based: 7 (5.5%) Education: 2 (1.6%) Coalition: 1 (0.8%) <ul style="list-style-type: none"> • Other Political Coalition: 1 (100.0%) 	Non-profit: 3 (42.9%) <ul style="list-style-type: none"> • Health: 2 (66.7%) • Policy: 1 (33.3%) Government: 2 (28.5%) <ul style="list-style-type: none"> • Legislative Branch: 2 (100.0%)
Opponent #/(%)	Business: 12 (9.4%) <ul style="list-style-type: none"> • Farmers Markets: 11 (8.6%) • Agriculture: 1 (0.8%) 	Government: 2 (28.5%) <ul style="list-style-type: none"> • Legislative Branch: 2 (100%)
Arguments (#)	159 (supporting and opposing)	10 (supporting and opposing)
Supporting (#/%)	Fairness: 68 (42.8%) Economic Security: 38 (23.9%)	Economic security: 2 (20%)

	Costs of obesity: 15 (9.4%) Protecting the public's health: 10 (6.3%) Obesity rates: 9 (5.7%)	
Opposing (#/%)	Feasibility & implementation: 16 (10.1%) Personal responsibility: 2 (1.3%) Fear of big government: 1 (0.6%)	Economic Security: 7 (70%) Feasibility & implementation: 1 (10%)
FAILED LEGISLATION	EXPANDING LEGISLATION (#/%)	RESTRICTING LEGISLATION
Total # Bills	56	63
Type of Bill (#/%)		
Farmers' market	11 (19.6%)	--
SNAP/WIC Expansion	11 (19.6%)	--
Grocery store Development	9 (16.0%)	--
Healthy food financing	29 (51.7%)	--
Task forces	16 (28.6%)	--
Promoting local produce	22 (39.2%)	--
SSB Taxes	--	50 (79.4)
SNAP/WIC Restriction	--	13 (20.6)
Stakeholders	63 (proponents & opponents)	142 (proponents & opponents)
Proponent	Non-profit: 25 (39.6%) <ul style="list-style-type: none"> Health: 11 (44.0%) Food & Nutrition: 5 (20.0%) Policy: 4 (16.0%) Finance: 2 (8.0%) Civic: 2 (8.0%) Labor Union: 1 (4.0%) Agriculture: 1 (4.0%) Government: 20 (31.7%) <ul style="list-style-type: none"> Legislative Branch: 13 (65.0%) Executive Branch: 7 (35.0%) Business: 5 (7.9%) <ul style="list-style-type: none"> Agriculture: 4 (80.0%) Health: 1 (20.0%) Hospital: 3 (4.8%) Faith-based: 2 (3.2%)	Non-profit: 38 (26.7%) <ul style="list-style-type: none"> Health: 33 (86.8%) Policy: 3 (7.9%) Civic: 1 (2.6%) Food & Nutrition: 1 (2.6%) Government: 24 (16.9%) <ul style="list-style-type: none"> Legislative Branch: 13 (54.2%) Executive Branch: 11 (44.8%) Education: 13 (9.2%) Hospital: 10 (6.3%) Coalition: 2 (1.4%) <ul style="list-style-type: none"> Taxpayer coalition 2 (100%) Faith-based: 1 (0.7%) Business: 1 (0.7%) <ul style="list-style-type: none"> Health: 1 (100%)
Opponent	Government: 3 (4.7%) <ul style="list-style-type: none"> Legislative Branch: 3 (100.0%) Non-profit: 1 (1.6%) <ul style="list-style-type: none"> Agriculture: 1 (100.0%) 	Business: 37 (26.1%) <ul style="list-style-type: none"> Retail Industry: 20 (54.1%) Food Industry: 14 (37.8%) Finance: 3 (8.1%) Non-profit: 7 (4.9%) <ul style="list-style-type: none"> Labor Unions: 4 (57.1%) Health: 2 (28.6%) Food & Nutrition: 1 (14.3%) Coalition: 7 (4.9%) <ul style="list-style-type: none"> Taxpayer coalition 7 (100%)

		Government: 4 (2.8%) <ul style="list-style-type: none"> Legislative Branch: 3 (75.0%) Executive Branch: 1 (25.0%)
Arguments (#)	153 (supporting and opposing)	643 (supporting and opposing)
Supporting (#/%)	Fairness: 51 (30.5%) Economic Security: 34 (19.8%) Costs of obesity: 21 (12.6%) Obesity Rates: 18 (10.8%) Protecting the public's health: 16 (9.6%) Tobacco Fight: 2 (1.2%)	Costs of obesity: 141 (21.9%) Economic Security: 92 (13.0%) Taxes encourage healthy behavior: 61 (9.5%) Obesity Rates: 46 (7.0%) Fairness: 30 (4.7%) Protecting the public's health: 21 (3.3%) Tobacco Fight: 23 (3.6%) Truthfulness: 10 (1.6%)
Opposing (#/%)	Personal responsibility: 5 (3.0%) Feasibility & Implementation: 4 (2.4%) Fear of big government: 2 (1.2%)	Economic Security: 63 (9.8%) Feasibility & Implementation: 46 (7.2%) Fear of Big Government: 33 (5.1%) Obesity multi-faceted problem: 27 (4.2%) Corporate Responsibility: 17 (2.6%) Truthfulness: 17 (2.6%) Personal Responsibility: 16 (2.5%)

Figure 4.2: Factual and value-laden arguments by legislation type.

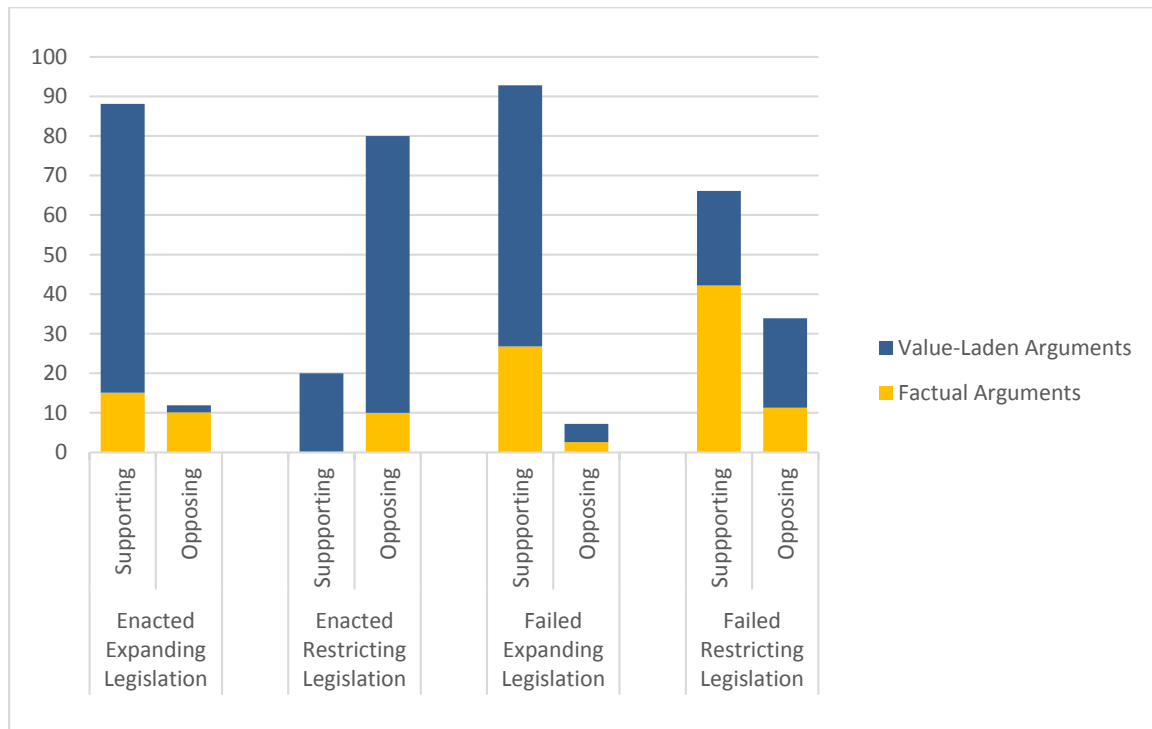


Figure 4.3: Kellogg's false & misleading claims on children's cereal boxes (2009–2010).



Table 4.7: Stakeholder Type, Category, and Sub-Category

Name	Status	Stakeholder Types	Bill Type	State	Category	Sub-Category
HMC Farms	Passed	Proponent	Expanding	California	Business	Agriculture
Meyers Farms Family Trust	Passed	Proponent	Expanding	California	Business	Agriculture
Ocean Mist Farms	Passed	Proponent	Expanding	California	Business	Agriculture
San Joaquin Tomato Growers	Passed	Proponent	Expanding	California	Business	Agriculture
Simonian Fruit Company	Passed	Proponent	Expanding	California	Business	Agriculture
Sunflower CRMP	Passed	Proponent	Expanding	California	Business	Agriculture
Van Groningen and Sons, Inc.	Passed	Proponent	Expanding	California	Business	Agriculture
Vessey and Company, Inc.	Passed	Proponent	Expanding	California	Business	Agriculture
Western Growers	Passed	Proponent	Expanding	California	Business	Agriculture
Pacific International Marketing	Passed	Proponent	Expanding	California	Business	Agriculture
T.D. Produce Sales	Passed	Proponent	Expanding	California	Business	Agriculture
Prima Frutta Packing, Inc.	Passed	Proponent	Expanding	California	Business	Agriculture
Berkeley Farmers' Markets	Passed	Proponent	Expanding	California	Business	Farmer's Market
Everyone's Harvest Farmers' Markets	Passed	Proponent	Expanding	California	Business	Farmer's Market
Monterey Bay Certified Farmers Market	Passed	Proponent	Expanding	California	Business	Farmer's Market
Watsonville Certified Farmers' Market	Passed	Proponent	Expanding	California	Business	Farmer's Market
Bank of America	Passed	Proponent	Expanding	California	Business	Finance
California FreshWorks Fund	Passed	Proponent	Expanding	California	Business	Finance
Charles Schwab Bank	Passed	Proponent	expanding	California	Business	Finance
Citi	Passed	Proponent	Expanding	California	Business	Finance
Emerging Markets	Passed	Proponent	Expanding	California	Business	Finance
JP Morgan Chase	Passed	Proponent	Expanding	California	Business	Finance
Kaiser Permanente	Passed	Proponent	Expanding	California	Business	Finance
MetLife	Passed	Proponent	Expanding	California	Business	Finance
Morgan Stanley	Passed	Proponent	Expanding	California	Business	Finance
NCB Capital Impact	Passed	Proponent	Expanding	California	Business	Finance
Opportunity Finance Network	Passed	Proponent	Expanding	California	Business	Finance
Social Compact	Passed	Proponent	Expanding	California	Business	Finance

The California Endowment	Passed	Proponent	Expanding	California	Business	Finance
The Reinvestment Fund	Passed	Proponent	Expanding	California	Business	Finance
U.S. Bank	Passed	Proponent	Expanding	California	Business	Finance
Mariposa Wellness Center	Passed	Proponent	Expanding	California	Business	Health
LiveWell	Passed	Proponent	Expanding	Colorado	Business	Health
Quality Packing	Passed	Proponent	Expanding	California	Business	Retail Industry
Podesta Packing	Passed	Proponent	Expanding	California	Business	Retail Industry
California Grocers Association	Passed	Proponent	Expanding	California	Business	Retail Industry
California Retailers Association	Passed	Proponent	Expanding	California	Business	Retail Industry
El Rancho Marketplace	Passed	Proponent	Expanding	California	Business	Retail Industry
Northgate Gonzalez Market	Passed	Proponent	Expanding	California	Business	Retail Industry
People's Community Market	Passed	Proponent	Expanding	California	Business	Retail Industry
California State Association of Counties	Passed	Proponent	Expanding	California	Coalition	Other Political Coalition
California State PTA	Passed	Proponent	Expanding	California	Education	
California State PTA	Passed	Proponent	Expanding	California	Education	
California Catholic Conference, Inc.	Passed	Proponent	Expanding	California	Faith-based	
California Catholic Conference, Inc.	Passed	Proponent	Expanding	California	Faith-based	
California Catholic Conference, Inc.	Passed	Proponent	Expanding	California	Faith-based	
Ola mo Keriso Church	Passed	Proponent	Expanding	California	Faith-based	
St. Anthony's of San Francisco	Passed	Proponent	Expanding	California	Faith-based	
Interfaith Council of Amador	Passed	Proponent	Expanding	California	Faith-based	
Interfaith Community Services	Passed	Proponent	Expanding	California	Faith-based	
Antonio Villagraigosa	Passed	Proponent	Expanding	California	Government	Executive Branch
Bill Ritter	Passed	Proponent	Expanding	Colorado	Government	Executive Branch
Deval Patrick	Passed	Proponent	Expanding	Massachusetts	Government	Executive Branch
James Butts	Passed	Proponent	Expanding	California	Government	Executive Branch
Kern County Dept. of Public Health	Passed	Proponent	Expanding	California	Government	Executive Branch
Michelle Obama	Passed	Proponent	Expanding	California	Government	Executive Branch
Agriculture and Forestry Commissioner	Passed	Proponent	Expanding	Louisiana	Government	Executive Branch
Thomas Menino	Passed	Proponent	Expanding	Massachusetts	Government	Executive Branch
Bob Bacon	Passed	Proponent	Expanding	Colorado	Government	Legislative Branch

Gilbert Wilson	Passed	Proponent	Expanding	New Jersey	Government	Legislative Branch
John A. Perez	Passed	Proponent	Expanding	California	Government	Legislative Branch
John Amodeo	Passed	Proponent	Expanding	New Jersey	Government	Legislative Branch
Marsha Looper	Passed	Proponent	Expanding	Colorado	Government	Legislative Branch
Mendocino Food and Nutrition Program	Passed	Proponent	Expanding	California	Government	Legislative Branch
Scott Simon	Passed	Proponent	Expanding	Louisiana	Government	Legislative Branch
California Farm Bureau Federation	Passed	Proponent	Expanding	California	Non-profit	Agriculture
California State Grange	Passed	Proponent	Expanding	California	Non-profit	Agriculture
California Women for Agriculture	Passed	Proponent	Expanding	California	Non-profit	Agriculture
Junior League of Los Angeles	Passed	Proponent	Expanding	California	Non-profit	Civic
Tri-City Volunteers	Passed	Proponent	Expanding	California	Non-profit	Civic
Community Action Agency of Butte County, Inc.	Passed	Proponent	Expanding	California	Non-profit	Civic
County Welfare Directors Association	Passed	Proponent	Expanding	California	Non-profit	Civic
Fremont Family Resource Center	Passed	Proponent	Expanding	California	Non-profit	Civic
Coalition of California Welfare Rights Organizations	Passed	Proponent	Expanding	California	Non-profit	Civic
Calvert Foundation	Passed	Proponent	Expanding	California	Non-profit	Finance
Community Redevelopment Agency of the City of Los Angeles	Passed	Proponent	Expanding	California	Non-profit	Finance
Alameda County Community Food Bank	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
California Association of Food Banks	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
California Hunger Action Coalition	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Community Food Bank	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Community Food Bank of San Benito County	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Feeding America San Diego	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Food Bank for Monterey County	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Food Bank of Contra Costa and Solano	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Food First	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Food for People	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition

Food FUNdamentals	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Food Bank of Santa Barbara County	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Hunger Action Los Angeles	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Imperial County Food Bank	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Los Angeles Regional Foodbank	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
End Hunger Connecticut	Passed	Proponent	Expanding	Connecticut	Non-profit	Food & Nutrition
Orange County Food Bank	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Redwood Empire Food Bank	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
San Francisco Food Bank	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Second Harvest Food Bank of Orange County	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Second Harvest Food Bank of Santa Clara and San Mateo Counties	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Second Harvest Food Bank of Santa Cruz County	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Shasta Senior Nutrition Programs/Food Bank	Passed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Having Our Say	Passed	Proponent	Expanding	California	Non-profit	Health
California District of the American Academy of Pediatrics	Passed	Proponent	Expanding	California	Non-profit	Health
California Nurses Association	Passed	Proponent	Expanding	California	Non-profit	Health
California Physical Therapy Association	Passed	Proponent	Expanding	California	Non-profit	Health
Community Clinic Association of Los Angeles County	Passed	Proponent	Expanding	California	Non-profit	Health
Community Health Councils	Passed	Proponent	Expanding	California	Non-profit	Health
County Health Executive Association of California	Passed	Proponent	Expanding	California	Non-profit	Health
Tradition One-Alcohol/Drug Rehabilitation Program	Passed	Proponent	Expanding	California	Non-profit	Health
Centro Binacional Para El Desarrollo Indigena Oaxaquen	Passed	Proponent	Expanding	California	Non-profit	Health
Children's Defense Fund - California	Passed	Proponent	Expanding	California	Non-profit	Health
American Federation of State, County and Municipal Employees	Passed	Proponent	Expanding	California	Non-profit	Labor Union

California Center for Rural Policy	Passed	Proponent	Expanding	California	Non-profit	Policy
California Food Policy Advocates	Passed	Proponent	Expanding	California	Non-profit	Policy
California Institute For Rural Studies	Passed	Proponent	Expanding	California	Non-profit	Policy
PolicyLink	Passed	Proponent	Expanding	California	Non-profit	Policy
Public Health Law and Policy	Passed	Proponent	Expanding	California	Non-profit	Policy
Agricultural Council of California	Passed	Opponent	Expanding	California	Business	Agriculture
California Federation of Certified Farmers' Markets	Passed	Opponent	Expanding	California	Business	Farmer's Market
Cedros Avenue Farmers Market	Passed	Opponent	Expanding	California	Business	Farmer's Market
Manteca Certified Farmers Market	Passed	Opponent	Expanding	California	Business	Farmer's Market
Monterey Bay Certified Farmers Market	Passed	Opponent	Expanding	California	Business	Farmer's Market
Occidental Bohemian Farmers Market	Passed	Opponent	Expanding	California	Business	Farmer's Market
Oroville Hospital's Community Farmers' Market	Passed	Opponent	Expanding	California	Business	Farmer's Market
Pacific Coast Farmers' Market Association	Passed	Opponent	Expanding	California	Business	Farmer's Market
Redlands Certified Farmers' Market	Passed	Opponent	Expanding	California	Business	Farmer's Market
Solana Beach Farmers Market	Passed	Opponent	Expanding	California	Business	Farmer's Market
Studio City Farmers Market	Passed	Opponent	Expanding	California	Business	Farmer's Market
MainStreet Oceanside	Passed	Opponent	Expanding	California	Business	Farmer's Market
Baird Orchards	Failed	Proponent	Expanding	Washington	Business	Agriculture
Market Garden NW, LLC	Failed	Proponent	Expanding	Washington	Business	Agriculture
NW Agricultural business Center	Failed	Proponent	Expanding	Washington	Business	Agriculture
Fresh Fruit and Vegetable Association	Failed	Proponent	Expanding	Florida	Business	Agriculture
HealthcareMaryland.org	Failed	Proponent	Expanding	Maryland	Business	Health
Montgomery County Progressive Alliance	Failed	Proponent	Expanding	Maryland	Coalition	Other Political Coalition
Progressive Democrats of America	Failed	Proponent	Expanding	Maryland	Coalition	Other Political Coalition
California Catholic Conference, Inc.	Failed	Proponent	Expanding	California	Faith-based	
Florida Catholic Conference	Failed	Proponent	Expanding	Florida	Faith-based	
American Red Cross WIC Program	Failed	Proponent	Expanding	California	Government	Executive Branch

Community Resource Project, Inc. WIC Program of Sacramento	Failed	Proponent	Expanding	California	Government	Executive Branch
Kings County Department of Public Health	Failed	Proponent	Expanding	California	Government	Executive Branch
Kings County WIC	Failed	Proponent	Expanding	California	Government	Executive Branch
Mono County WIC	Failed	Proponent	Expanding	California	Government	Executive Branch
Scripps Mercy WIC Program	Failed	Proponent	Expanding	California	Government	Executive Branch
Washington Environmental Council	Failed	Proponent	Expanding	Washington	Government	Executive Branch
Nydia M. Velazquez	Failed	Proponent	Expanding	New York	Government	Legislative Branch
Haugen	Failed	Proponent	Expanding	Washington	Government	Legislative Branch
Jacobson	Failed	Proponent	Expanding	Washington	Government	Legislative Branch
Tahoma Food Policy	Failed	Proponent	Expanding	Washington	Government	Legislative Branch
Ronda Storms	Failed	Proponent	Expanding	Florida	Government	Legislative Branch
John A. Perez	Failed	Proponent	Expanding	California	Government	Legislative Branch
Gail Schwartz	Failed	Proponent	Expanding	Colorado	Government	Legislative Branch
John A. Perez	Failed	Proponent	Expanding	California	Government	Legislative Branch
Donald Norcross	Failed	Proponent	Expanding	New Jersey	Government	Legislative Branch
Keiser	Failed	Proponent	Expanding	Washington	Government	Legislative Branch
Kohl-Welles	Failed	Proponent	Expanding	Washington	Government	Legislative Branch
Swecker	Failed	Proponent	Expanding	Washington	Government	Legislative Branch
Gary Siplin	Failed	Proponent	Expanding	Florida	Government	Legislative Branch
Gary Siplin	Failed	Proponent	Expanding	Florida	Government	Legislative Branch
Catholic Healthcare West	Failed	Proponent	Expanding	California	Hospital	
Antelope Valley Hospital	Failed	Proponent	Expanding	California	Hospital	
Watts Healthcare Corporation	Failed	Proponent	Expanding	California	Hospital	
Washington Sustainable Food and Farming Network	Failed	Proponent	Expanding	Washington	Non-profit	Agriculture
Junior League	Failed	Proponent	Expanding	Florida	Non-profit	Civic
First 5 LA	Failed	Proponent	Expanding	California	Non-profit	Civic
Fresno County Economic Opportunities Commission	Failed	Proponent	Expanding	California	Non-profit	Finance
Insight Center for Community Economic Development	Failed	Proponent	Expanding	California	Non-profit	Finance
California Food Policy Advocates	Failed	Proponent	Expanding	California	Non-profit	Food & Nutrition

Bay Region WIC Association	Failed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Second Harvest Food Bank of Orange County	Failed	Proponent	Expanding	California	Non-profit	Food & Nutrition
Florida Association of Food Banks	Failed	Proponent	Expanding	Florida	Non-profit	Food & Nutrition
Second Harvest Food Bank of Central Florida	Failed	Proponent	Expanding	Florida	Non-profit	Food & Nutrition
Latino Coalition for a Healthy California	Failed	Proponent	Expanding	California	Non-profit	Health
Childhood Obesity Prevention Coalition	Failed	Proponent	Expanding	Washington	Non-profit	Health
California Medical Association	Failed	Proponent	Expanding	California	Non-profit	Health
California Primary Care Association	Failed	Proponent	Expanding	California	Non-profit	Health
WIC of Planned Parenthood of Orange and San Bernardino Counties	Failed	Proponent	Expanding	California	Non-profit	Health
California Medical Association	Failed	Proponent	Expanding	California	Non-profit	Health
California Primary Care Association	Failed	Proponent	Expanding	California	Non-profit	Health
California Medical Association	Failed	Proponent	Expanding	California	Non-profit	Health
American Heart Association	Failed	Proponent	Expanding	Florida	Non-profit	Health
American Heart Association	Failed	Proponent	Expanding	Florida	Non-profit	Health
Latino Coalition for a Healthy California	Failed	Proponent	Expanding	California	Non-profit	Health
American Federation of State, County and Municipal Employees	Failed	Proponent	Expanding	California	Non-profit	Labor Union
California Food Policy Advocates	Failed	Proponent	Expanding	California	Non-profit	Policy
California Food Policy Advocates	Failed	Proponent	Expanding	California	Non-profit	Policy
California Food Policy Advocates	Failed	Proponent	Expanding	California	Non-profit	Policy
Western Center on Law and Poverty	Failed	Proponent	Expanding	California	Non-profit	Policy
Kretz	Failed	Opponent	Expanding	Washington	Government	Legislative Branch
Pearson	Failed	Opponent	Expanding	Washington	Government	Legislative Branch
Warnick	Failed	Opponent	Expanding	Washington	Government	Legislative Branch
Washington Farm Bureau	Failed	Opponent	Expanding	Washington	Non-Profit	Agriculture
Don Coram	Failed	Proponent	Expanding	Colorado	Government	Legislative Branch
County of Santa Clara Board of Supervisors	Passed	Proponent	Restricting	California	Government	Legislative Branch
John Morse	Passed	Proponent	Restricting	Colorado	Government	Legislative Branch

Prevention Institute	Passed	Proponent	Restricting	California	Non-profit	Health
California Pan-Ethnic Health Network	Passed	Proponent	Restricting	California	Non-profit	Health
California Rural Legal Assistance Foundation	Passed	Proponent	Restricting	California	Non-profit	Policy
Bill Cadman	Passed	Opponent	Restricting	Colorado	Government	Legislative Branch
Josh Penry	Passed	Opponent	Restricting	Colorado	Government	Legislative Branch
New York City Health and Hospitals Corporation	Failed	Proponent	Restricting	New York	Business	Health
California Tax Reform Association	Failed	Proponent	Restricting	California	Coalition	Taxpayer Coalition
California Tax Reform Association	Failed	Proponent	Restricting	California	Coalition	Taxpayer Coalition
California School Nutrition Association	Failed	Proponent	Restricting	California	Education	
Abraham Lincoln High School	Failed	Proponent	Restricting	California	Education	
Balboa High School	Failed	Proponent	Restricting	California	Education	
Galileo Academy of Science & Technology High School	Failed	Proponent	Restricting	California	Education	
George Washington High School	Failed	Proponent	Restricting	California	Education	
International Studies Academy High School	Failed	Proponent	Restricting	California	Education	
John O'Connell High School	Failed	Proponent	Restricting	California	Education	
Lowell High School	Failed	Proponent	Restricting	California	Education	
Philip & Sala Burton High School	Failed	Proponent	Restricting	California	Education	
Raoul Wallenberg High School	Failed	Proponent	Restricting	California	Education	
Santa Monica-Bonita School District	Failed	Proponent	Restricting	California	Education	
Thurgood Marshall High School	Failed	Proponent	Restricting	California	Education	
Partnership for Children and Youth	Failed	Proponent	Restricting	California	Education	
Fresno Metro Ministry	Failed	Proponent	Restricting	California	Faith-based	
Vermont Health Commissioner	Failed	Proponent	Restricting	Vermont	Government	Executive Branch
California WIC Association	Failed	Proponent	Restricting	California	Government	Executive Branch
San Mateo County Board of Supervisors	Failed	Proponent	Restricting	California	Government	Executive Branch
The Oregon Health Division	Failed	Proponent	Restricting	Oregon	Government	Executive Branch
David Paterson	Failed	Proponent	Restricting	New York	Government	Executive Branch
Michael Bloomberg	Failed	Proponent	Restricting	New York	Government	Executive Branch

Alameda County Board of Supervisors	Failed	Proponent	Restricting	California	Government	Executive Branch
California WIC Association	Failed	Proponent	Restricting	California	Government	Executive Branch
Department of Health	Failed	Proponent	Restricting	Hawaii	Government	Executive Branch
Department of Taxation	Failed	Proponent	Restricting	Hawaii	Government	Executive Branch
Neil Abercrombie	Failed	Proponent	Restricting	Hawaii	Government	Executive Branch
John Mayo	Failed	Proponent	Restricting	Mississippi	Government	Legislative Branch
Catherine Mulholland	Failed	Proponent	Restricting	New Hampshire	Government	Legislative Branch
Bill Monning	Failed	Proponent	Restricting	California	Government	Legislative Branch
Dean Florez	Failed	Proponent	Restricting	California	Government	Legislative Branch
Kevin McCarty	Failed	Proponent	Restricting	California	Government	Legislative Branch
Eddie Lucio Jr.	Failed	Proponent	Restricting	Texas	Government	Legislative Branch
Mitch Greenlick	Failed	Proponent	Restricting	Oregon	Government	Legislative Branch
Bill Monning	Failed	Proponent	Restricting	California	Government	Legislative Branch
County of Santa Clara Board of Supervisors	Failed	Proponent	Restricting	California	Government	Legislative Branch
Edith H. Adjello	Failed	Proponent	Restricting	Rhode Island	Government	Legislative Branch
Jack Latvala	Failed	Proponent	Restricting	Florida	Government	Legislative Branch
Scott Plakon	Failed	Proponent	Restricting	Florida	Government	Legislative Branch
Bill Avery	Failed	Proponent	Restricting	Nebraska	Government	Legislative Branch
Laredo City Health Department	Failed	Proponent	Restricting	Texas	Hospital	
Catholic Healthcare West	Failed	Proponent	Restricting	California	Hospital	
Department of Pediatrics (28 physicians)	Failed	Proponent	Restricting	California	Hospital	
Central Valley Health Network	Failed	Proponent	Restricting	California	Hospital	
Brown University Children's Environmental Health Center	Failed	Proponent	Restricting	Rhode Island	Hospital	
Care New England	Failed	Proponent	Restricting	Rhode Island	Hospital	
Hospitals for a Healthy Environment in Rhode Island	Failed	Proponent	Restricting	Rhode Island	Hospital	
Thundermist Health Center	Failed	Proponent	Restricting	Rhode Island	Hospital	
Lucile Packard Children's Hospital	Failed	Proponent	Restricting	California	Hospital	
First 5 LA	Failed	Proponent	Restricting	California	Non-profit	Civic
Food Empowerment Project	Failed	Proponent	Restricting	California	Non-profit	Food & Nutrition

Chula Vista Healthy Eating Active Communities	Failed	Proponent	Restricting	California	Non-profit	Health
Alliance for a Healthier Vermont	Failed	Proponent	Restricting	Vermont	Non-profit	Health
California Center for Public Health Advocacy	Failed	Proponent	Restricting	California	Non-profit	Health
Children Now	Failed	Proponent	Restricting	California	Non-profit	Health
California Center for Public Health Advocacy	Failed	Proponent	Restricting	California	Non-profit	Health
Children Now	Failed	Proponent	Restricting	California	Non-profit	Health
Alliance for a Healthier Rhode Island	Failed	Proponent	Restricting	Rhode Island	Non-profit	Health
Prevention Institute	Failed	Proponent	Restricting	California	Non-profit	Health
Strategic Alliance for Healthy Food and Activity Environments	Failed	Proponent	Restricting	California	Non-profit	Health
Statewide Independent Living Council of Kansas	Failed	Proponent	Restricting	Kansas	Non-profit	Health
Health Improvement Partnership of Santa Cruz County	Failed	Proponent	Restricting	California	Non-profit	Health
Texas Association of Local Health Officials	Failed	Proponent	Restricting	Texas	Non-profit	Health
California Chiropractic Association	Failed	Proponent	Restricting	California	Non-profit	Health
Dental Health Foundation	Failed	Proponent	Restricting	California	Non-profit	Health
Upstream Public Health	Failed	Proponent	Restricting	Oregon	Non-profit	Health
California Academy of Physician Assistants	Failed	Proponent	Restricting	California	Non-profit	Health
California Association for Health, Physical Education, Recreation & Dance	Failed	Proponent	Restricting	California	Non-profit	Health
California Chiropractic Association	Failed	Proponent	Restricting	California	Non-profit	Health
California Pan-Ethnic Health Network	Failed	Proponent	Restricting	California	Non-profit	Health
Center for Oral Health	Failed	Proponent	Restricting	California	Non-profit	Health
Chiropractic Society of Rhode Island	Failed	Proponent	Restricting	Rhode Island	Non-profit	Health
Neighborhood Health Plan of Rhode Island	Failed	Proponent	Restricting	Rhode Island	Non-profit	Health
New England Alliance for Children's Health	Failed	Proponent	Restricting	Rhode Island	Non-profit	Health

Rhode Island Academy of Family Physicians	Failed	Proponent	Restricting	Rhode Island	Non-profit	Health
Rhode Island Chapter - American Academy of Pediatrics	Failed	Proponent	Restricting	Rhode Island	Non-profit	Health
Rhode Island Dental Assistants Associations	Failed	Proponent	Restricting	Rhode Island	Non-profit	Health
Rhode Island Health Center Association	Failed	Proponent	Restricting	Rhode Island	Non-profit	Health
Rhode Island Medical Society	Failed	Proponent	Restricting	Rhode Island	Non-profit	Health
Rhode Island State Nurses Association	Failed	Proponent	Restricting	Rhode Island	Non-profit	Health
Network of Ethnic Physician Organizations	Failed	Proponent	Restricting	California	Non-profit	Health
Venice Family Clinic	Failed	Proponent	Restricting	California	Non-profit	Health
American Cancer Society	Failed	Proponent	Restricting	Hawaii	Non-profit	Health
Children Now	Failed	Proponent	Restricting	California	Non-profit	Health
Rudd Center for Food Policy & Obesity	Failed	Proponent	Restricting	Kansas	Non-profit	Policy
Center for Science in the Public Interest	Failed	Proponent	Restricting	California	Non-profit	Policy
California Rural Legal Assistance Foundation	Failed	Proponent	Restricting	California	Non-profit	Policy
California Chamber of Commerce	Failed	Opponent	Restricting	California	Business	Finance
California Chamber of Commerce	Failed	Opponent	Restricting	California	Business	Finance
Maui Chamber of Commerce	Failed	Opponent	Restricting	Hawaii	Business	Finance
Beverage Association of Vermont	Failed	Opponent	Restricting	Vermont	Business	Food Industry
California Restaurant Association	Failed	Opponent	Restricting	California	Business	Food Industry
California Restaurant Association	Failed	Opponent	Restricting	California	Business	Food Industry
California Restaurant Association	Failed	Opponent	Restricting	California	Business	Food Industry
Hawaii Food Industry Association	Failed	Opponent	Restricting	Hawaii	Business	Food Industry
American Beverage Association	Failed	Opponent	Restricting	Rhode Island	Business	Food Industry
American Beverage Association	Failed	Opponent	Restricting	Hawaii	Business	Food Industry
American Beverage Association	Failed	Opponent	Restricting	New York	Business	Food Industry
American Beverage Association	Failed	Opponent	Restricting	Texas	Business	Food Industry
California Nevada Soft Drink Association	Failed	Opponent	Restricting	California	Business	Food Industry

California Nevada Soft Drink Association	Failed	Opponent	Restricting	California	Business	Food Industry
Coca Cola	Failed	Opponent	Restricting	Rhode Island	Business	Food Industry
Coca Cola	Failed	Opponent	Restricting	Hawaii	Business	Food Industry
Coca Cola	Failed	Opponent	Restricting	New York	Business	Food Industry
California Automatic Vendors Council	Failed	Opponent	Restricting	California	Business	Retail Industry
California Automatic Vendors Council	Failed	Opponent	Restricting	California	Business	Retail Industry
California Grocers Association	Failed	Opponent	Restricting	California	Business	Retail Industry
California Grocers Association	Failed	Opponent	Restricting	California	Business	Retail Industry
California Independent Grocers Association	Failed	Opponent	Restricting	California	Business	Retail Industry
California Independent Grocers Association	Failed	Opponent	Restricting	California	Business	Retail Industry
California Manufacturers & Technology Association	Failed	Opponent	Restricting	California	Business	Retail Industry
California Manufacturers & Technology Association	Failed	Opponent	Restricting	California	Business	Retail Industry
California Manufacturers & Technology Association	Failed	Opponent	Restricting	California	Business	Retail Industry
California Retailers Association	Failed	Opponent	Restricting	California	Business	Retail Industry
California Retailers Association	Failed	Opponent	Restricting	California	Business	Retail Industry
Grocery Manufacturers Association	Failed	Opponent	Restricting	Texas	Business	Retail Industry
Hawaii Bar Owners Association	Failed	Opponent	Restricting	Hawaii	Business	Retail Industry
National Supermarket Association	Failed	Opponent	Restricting	New York	Business	Retail Industry
Nebraska Grocery Industry Association	Failed	Opponent	Restricting	Kansas	Business	Retail Industry
New York Association of Convenience Stores	Failed	Opponent	Restricting	New York	Business	Retail Industry
Texas Retailers Association	Failed	Opponent	Restricting	Texas	Business	Retail Industry
Texas Retailers Association	Failed	Opponent	Restricting	Texas	Business	Retail Industry
Topeka Hospitality LC	Failed	Opponent	Restricting	Kansas	Business	Retail Industry
Treat America Food Services	Failed	Opponent	Restricting	Kansas	Business	Retail Industry
California Taxpayers Association	Failed	Opponent	Restricting	California	Coalition	Taxpayer Coalition

California Taxpayers Association	Failed	Opponent	Restricting	California	Coalition	Taxpayer Coalition
California Taxpayers Association	Failed	Opponent	Restricting	California	Coalition	Taxpayer Coalition
Californians Against Higher Taxes	Failed	Opponent	Restricting	California	Coalition	Taxpayer Coalition
Howard Jarvis Taxpayers Association	Failed	Opponent	Restricting	California	Coalition	Taxpayer Coalition
New Yorkers Against Unfair Taxes	Failed	Opponent	Restricting	New York	Coalition	Taxpayer Coalition
Oregon Coalition Against Beverage Taxes	Failed	Opponent	Restricting	Oregon	Coalition	Taxpayer Coalition
Peter Shumlin	Failed	Opponent	Restricting	Vermont	Government	Executive Branch
Audrey Gibson	Failed	Opponent	Restricting	Florida	Government	Legislative Branch
Diane Savino	Failed	Opponent	Restricting	New York	Government	Legislative Branch
Nancy Detert	Failed	Opponent	Restricting	Florida	Government	Legislative Branch
Texas Food Bank Network	Failed	Opponent	Restricting	Texas	Non-Profit	Food & Nutrition
Texans Care for Children	Failed	Opponent	Restricting	Texas	Non-Profit	Health
Texans Care for Children	Failed	Opponent	Restricting	Texas	Non-Profit	Health
California Teamsters Public Affairs Council	Failed	Opponent	Restricting	California	Non-Profit	Labor Union
Teamsters	Failed	Opponent	Restricting	New York	Non-Profit	Labor Union
Teamsters Joint Council 16	Failed	Opponent	Restricting	New York	Non-Profit	Labor Union
Teamsters Local 41	Failed	Opponent	Restricting	Kansas	Non-Profit	Labor Union

CHAPTER 5: DISCUSSION

Obesity is the leading preventable cause of illness and a major contributor to morbidity and mortality in the United States.¹⁷ Consuming fresh fruits and vegetables (F&V) can help prevent weight gain and reduce the risk of obesity-related chronic diseases.¹ Unfortunately, lower-income individuals do not meet the USDA's 2010 recommendation of consuming five F&V servings per day.^{2,3} In North Carolina, 15% of adults with an annual income of \$15,000 or less meet F&V intake guidelines compared to 30% of individuals with annual incomes more than \$50,000.³ Residents of low-income areas often lack access to fresh F&Vs, which is one, but not the only factor, influencing F&V consumption.⁴ The socio-ecological framework of health helped guide the development of this dissertation in that it suggests that many levels of influence, including individual, inter-personal, community, and public policy levels, are needed to improve F&V access and consumption among low-income individuals.⁶ Access to and consumption of fresh F&Vs is a multi-dimensional process in which dimensions can interact with each other to influence access and, in turn, consumption. To capture these levels of influence, the first study examined individual-level and community-level perceptions, the second community-level factors, and the third public policies that impact F&V access.

Due to the multi-dimensionality of F&V access and consumption, a mixed-methods study seemed most appropriate for studying its relationship to F&V consumption. Mixed methods research is critical to understanding phenomenon with complex and dynamic relationships. One method can often be used to inform, complement, or confirm the results of

another method and help guide the development of programs and policies.³⁸ This dissertation consisted of both qualitative and quantitative studies. Combining qualitative and quantitative research is helpful to understand how socio-economic contexts affect low-income individuals' dietary behaviors.

In the first study, I used a qualitative approach to assess low-income individuals' perceptions about barriers to fresh FV consumption and how F&V access programs in North Carolina could improve F&V access and consumption. After analyzing results from focus groups, I wanted to quantitatively test if the F&V access facilitators participants discussed (including affordability, quality, and convenience) were associated with F&V consumption. Additionally, I wanted to test whether proximity, or other perceived access measures, were most closely linked to F&V consumption. Therefore, the second study compared the predictive power of geographic information systems (GIS) and self-reported perceived access data for estimating the association between F&V access and consumption. The third study, though not sequentially related to the first two studies, was used to gather a general understanding of the policy landscape for improving F&V access and consumption through state legislation. Therefore, I analyzed stakeholder arguments in access to healthy food state-level legislation introduced between 2010 and 2012 in bill hearings and newspapers.

Summary of Findings

In the first study, Chapter 2, focus group participants stated that the top 10 barriers to purchasing fresh F&V were: affordability, cooking and nutrition knowledge, convenience, quality, personal food preferences, availability, transportation, perishability, variety, and safety. When discussing F&V access programs to overcome these barriers, participants felt that mobile markets could address barriers such as availability of fresh F&V, convenience of

purchasing and preparing fresh F&V, transportation, and produce quality and variety. However, they were still concerned about produce perishability and vendor safety in the community. In regards to the second F&V access program, EBT at farmers' markets, focus group participants had mixed opinions about how helpful EBT would be in overcoming cost barriers. Even with food assistance benefits, some participants felt their SNAP monthly allowance was not enough to assist with purchasing fresh F&V at farmers' markets. The last program, community gardens, had the greatest uncertainty, mostly surrounding feasibility and implementation. Although participants agreed that community gardens could be a great place to receive fresh, affordable, conveniently located produce, they worried that their neighborhoods would not be the best fit due to safety and logistical issues. Though mobile markets received the most interest, the focus group participants suggested that mobile markets would be more successful if they simultaneously addressed other barriers such as lack of cooking and nutrition knowledge, cost, stigma, and vendor or participant safety. These key elements should be built into any F&V program.

In the second study, Chapter 3, quantitative results showed that GIS-based measures had more predictive power than perceived access measures for estimating the association between F&V access and consumption. For food outlets within 1 mile of a participant's home, increasing the number of grocery stores was associated with higher daily F&V intake. Although only marginally significant, more convenience stores within 1 mile of a participant's home was associated with a lower daily F&V consumption. Surprisingly, after examining food outlets within 3 miles of participants' home, convenience stores were associated with higher consumption and grocery stores were associated with lower consumption, suggesting that when grocery stores are farther away, individuals may choose a

more convenient food outlet to do their food shopping. Further analyses of low-income participants revealed that F&Vs were consumed more when participants lived within 1 mile of grocery stores compared to those who lived within 3 miles. Contrary to my hypothesis, the perceived access measures (affordability, quality, variety, and convenience of purchasing/preparing produce) were not statistically associated with higher F&V consumption.

Although qualitative results from the first study suggested that focus group participants thought that overcoming affordability, quality, variety, and convenience of purchasing/preparing produce through F&V access programs could help improve consumption, quantitative results from the second study found no significant relationship between perceived access measures and consumption. However, focus group participants did report that overcoming accessibility and transportation issues would also help them improve F&V consumption, which would confirm Study 2's results showing that presence of grocery stores within 1 mile is associated with higher F&V consumption. Although these two study's offered somewhat mixed results, this is not highly uncommon in mixed methods research.¹³⁹ There are several limitations in Study 2 that may have influenced the outcomes. First, there was a very small sample size (N=115) in Study 2, which may have led to the lack of statistical significance in several of the key independent variables. Over the next 12 months, the Green Cart Evaluation Study plans to survey an additional 200 participants. I plan to combine these participants' survey results with my current sample and rerun my analyses. Second, the F&V screener questions asked participants to report on consumption of "fresh, frozen or canned" F&Vs whereas the perceived access questions asked participants to report only on access to fresh F&Vs. Therefore, it might be reasonable to assume that the study

over-reports fresh F&V consumption (because the measure includes fresh, frozen, and canned), leading to null findings with perceived access measures. Additionally, the study samples may not be comparable. The focus group participants were not the same individuals as my Green Carty Survey participants. That is, they may have differing views and opinions for how F&V access relates to F&V consumption.

In the last paper, Chapter 4, I applied content analysis to stakeholder arguments in access to healthy food state-level legislation in newspapers and bill hearings. I analyzed 137 bills introduced in 34 states, of which 18 of which were enacted into law. Bill types were categorized as either “expanding” access to healthy food or “restricting” access to unhealthy food, and then further categorized into eight topics. Expanding legislation included farmers’ markets (supporting market development and other initiatives such as promoting EBT at farmers’ markets), food assistance program expansion (implementing state-wide EBT systems for WIC, expanding SNAP programs, and increasing funding for recipients), grocery store/super market development, healthy food financing (promoting initiatives to encourage communities and businesses to expand access to healthy food, including offering grants and/or tax incentives for businesses to sell healthy food in underserved communities), promoting local produce, and task forces (to study access to healthy food issues and offer recommendations to address these issues). Restricting legislation included restrictions on unhealthy food access to items such as sugar sweetened beverages (SSB) taxes and prohibiting SNAP recipients to purchase SSB and snacks with SNAP benefits.

Based on the qualitative results from Study 1, expanding food assistance programs and offering healthy food financing initiatives to improve affordability, quality, variety, and convenience of fresh F&Vs might have the biggest impact on improving access and

consumption. Because several participants perceived farmers' markets to be too expensive to purchase produce from, increasing farmers' markets and encouraging farmers' markets to accept EBT might not have a huge effect on access and consumption. However, based on the quantitative results, if the density of food outlets are a better predictor of F&V consumption, increasing the number of grocery stores and supermarkets within 1 mile of lower-income communities might make the biggest impact.

In terms of determining which bills were enacted into law, bills that expanded access to healthy food rather than restricted access were more likely to pass, most likely because they were less controversial and had more supporters. Bills that passed had 10 times more supporters than opponents. For enacted legislation, non-profit organizations, businesses, and government were the largest proponents. Among the stakeholder arguments used to support expanding legislation, fairness and economic security were the two most frequently cited supporting value-laden frames. Often bill justifications were based on the premise that food access disproportionally affects low-income populations or that investing in the local economy would increase property values and tax revenue.

Among the four categories of legislation types (passed expanding, passed restricting, failed expanding, and failed restricting), failed restricting legislation was the largest category. Sugar-sweetened beverage tax bills accounted for nearly 80% of all failed restricting legislation. This study showed that bills that restrict personal choice and raise taxes were more likely to face political opposition than those that expanded access to healthy foods. Sugar-sweetened beverage taxes were opposed by both small businesses and large corporations and ranged from distributors to bottlers and store managers. Among the businesses, over 90% were from either the retail or food industry. Although proponents

focused mainly on factual arguments as the basis for restricting bills, opponents focused heavily on value-laden arguments such as economic security, fear of big government, and personal responsibility. Many businesses argued that SSB taxes would harm the beverage industry through reduced profits margins and that SSB taxes would disproportionately affect lower- to middle-income consumers, as well as restrict individuals' freedom to purchase beverages of their choice. In general, businesses were more likely to appeal to individuals' core values than government or non-profit organizations. Although businesses did not play a huge role in most of the types of legislation they appear to have had a large influence in the failed restricting legislation. Equally important, businesses relied successfully on value-laden messages appealing to our personal liberties and to personal responsibility. Therefore, policymakers and advocates may want to counteract the food industry's messages with other value-laden messages such as economic security, protecting the public's health, and individuals' rights to healthy food. Value-laden messages should be tested to see which are most effective in changing public opinion about the food industry.

Limitations

Several limitations exist in this study. For the first two studies, Chapters 2-3, the small sample size and geographic scope limits the generalizability of the findings. These studies focus only on urban communities in North Carolina. Because focus group and Green Cart Survey participants lived in urban areas, the findings may have looked different if the study was conducted with rural participants living in North Carolina. Rural North Carolina communities might experience unique issues to F&V access that differ from urban communities. Additionally, individuals living in other states might endure food access and consumption issues that are unique to their state or region.

For the second study, Chapter 3, the biggest limitation involved the wording of the F&V screener questions, which asked participants to report their consumption of “fresh, frozen or canned” F&Vs. However, the perceived access questions (affordability, quality, variety, and convenience) asked participants to report only on access to fresh F&Vs. This introduced measurement error into the study, and it could be reasonable to assume that the null findings with the perceived access measures were due to the over-reporting of fresh F&V consumption (because the measure included fresh, frozen, and canned F&Vs), which reduced the effect of perceived access measures to fresh F&Vs. Additionally, distance was measured using a straight-line distance between two points, known as the Euclidean distance or “as the crow flies” rather than using the road networks participants would normally use to travel. However, for individuals lacking personal transportation, Euclidean distances or road networks do not take into account public transportation, including bus routes and frequency of buses, therefore underestimating the distance it takes to travel to a food outlet. This may have influenced the perceived access of traveling to grocery stores. Last, in terms of grocery shopping patterns, participants may have shopped for fresh F&V at food outlets close to their places of employment or children’s school(s) and not near their home. This could reduce the effect of the relationship between perceived access and F&V intake.

In the last study, Chapter 4, using the Yale Rudd Center for Food Policy and Obesity’s Legislation Database to identify bills, InfoTrac Custom Newsstand to identify articles, and state legislature’s website to identify committee meetings, bill hearings, and testimonies could have led to some data being missed or incorrectly categorized under a bill topic. Therefore, this analysis is only based on information obtained from these three data

sources and may not contain an exhaustive list of all bills and legislative documents relating to legislation introduced between 2010 and 2012.

Policy Implications

Determining which F&V access factors have the strongest association with F&V consumption is important to increasing our understanding of what types of policies and programs can have the greatest impact on diet and health outcomes. Understanding which factors are more influential for specific groups, specifically lower-income and minority populations, can offer useful guidance for these future efforts. The mixed findings from the qualitative and quantitative studies might suggest that changing the community food environment while also addressing how low-income individuals' perceive and interact with that environment is the first step towards increasing F&V access and consumption.

Because the second study showed that living within 1 mile of grocery stores was associated with higher F&V consumption for individuals receiving government assistance, policy efforts should focus on improving geographic proximity to healthier food outlets. That is, using healthy food financing programs to incentivize grocery stores to centrally locate in lower-income communities within 1 mile of neighborhoods, because GIS results showed that 3 miles may be too far and inconvenient for low-income populations to purchase fresh F&Vs. Study 2's results also show that GIS and perceived access measures were more correlated for educated, higher-income individuals, suggesting that they have more awareness of their food environment and may be willing to drive further distances to food outlets that carry produce they value (i.e., higher quality and better variety). Therefore, policymakers might consider investing in more education-based programs to change low-income individuals' food preferences and increase demand for fresh F&Vs, hopefully leading to increased

consumption. Programs should address attitudes toward fresh F&Vs and dietary behaviors of low-income individuals by discussing the health benefits of incorporating fresh F&Vs into diets and menu planning on a limited budget.

When examining the broader policy scene in states introducing legislation to promote access to healthy food, it is important to remember the lessons learned from public health's fight against the tobacco industry using tobacco-control legislation. Due to obesity's high morbidity rates and healthcare costs, as well as similar social and psychological influences to smoking, public health advocates are calling obesity the "new tobacco."⁸⁸ Because of these similarities, frames used in the fight against tobacco may be helpful in promoting access to healthy foods or reduce access to unhealthy food.

During the fight against the tobacco industry, early tobacco-control legislation failed because the industry marketed their public messages effectively—framing arguments to suggest that smoking was about individual choice and personal responsibility. However, after publicizing the tobacco industry's manipulation of nicotine levels, the harms of secondhand smoke, and intentional advertising to youth,⁸⁸ public support for smoking decreased and policymakers seized the opportunity to successfully enact tobacco-control legislation. Based on Study 3, access to healthy food legislation is still in the early stages, where the food industry is using similar value-laden arguments about individual choice and personal responsibility. Because appealing to individuals' core values is more effective than using fact-based arguments, public health advocates or other proponents of legislation to restrict use of unhealthy food should take advantage of emerging scientific evidence showing the addictive properties of sugar, as well as reports revealing the food industry intentionally targeting their advertisements to youth and minorities, thus negating the industry's frames to

promote individual choice and personal responsibility. Capitalizing on these frames may reduce public support for the food industry and certain unhealthy products.

Future Research

These three studies suggest that low-income individuals value affordability, high quality, and a variety of fresh F&V but are most likely to consume them when they are within 1 mile of their home, and when they are convenient to purchase and prepare. Yet supermarkets and grocery stores in lower-income communities do not always offer high-quality fresh F&Vs, in part because they perceive there is no demand for these products. In 2001, the International Council on Shopping Centers, in collaboration with Business for Social Responsibility, distributed a survey to food retailers exploring reasons for their reluctance to enter into lower-income communities. Survey results showed that retailers' top concerns were the perception of crime, lack of potential profitability, and difficulties meeting the needs of diverse customers.¹⁴¹ At the individual level, when grocery stores do not sell high-quality merchandise or offer sufficient produce variety, lower-income individuals choose not to buy fresh F&Vs from these stores because they perceive the produce to be of poor quality and would rather spend their dollars elsewhere.

The disconnect between grocery stores' perceived lack of demand for high-quality F&V in low-income communities and what low-income individuals profess that they want to buy leads to the question of "How can the cycle of miscommunication be broken?" One strategy that has shown to be successful is recruiting smaller, independently owned stores into low-income communities. These stores have the potential to be successful because they can adapt their products and practices to meet customer's needs and food preferences.¹⁴² Another option for tailoring produce and other food products to meet customer's needs is to

arrange meetings between community advocates and leaders so business owners can learn about their customers' preferences.¹⁴³ Other industries have also had success in bringing potential customers to the table to address business owners' concerns about the effect of crime on their business.¹⁴⁴

Although there are some success stories of grocery stores in underserved and low-income communities, there are many more examples of stores closing in these neighborhoods due to lack of profitability. What are the factors that contribute to one grocery store succeeding while another fails? Is it that some communities are more organized around marketing and promoting change at the grocery store corporate level? Did some communities implement educational campaigns to bolster interest and desire for higher quality fresh F&Vs in the community? Whatever the factors are, researchers should work with grocery stores or mobile markets to obtain data about store policies, processes, and produce revenues, as well as surveying community members in an attempt to determine which factors are associated with grocery stores successfully operating in lower-income communities.

The overarching results of this dissertation study suggest the need for additional research to identify specific factors that link F&V access and consumption and determine the direction and magnitude of their associations. Using the SEF to guide this study was helpful for organizing F&V access factors into their respective varying levels of influence—individual, interpersonal, community (including the food environment and store environment), or public policy. The SEF framework gave me the opportunity to develop a story-telling platform for which I could build each study into the dissertation and transition into the next study. Additionally, the SEF encouraged me to think how specific F&V access factors in varying levels could influence factors in other levels, such as how personal food

preferences might affect the store environment or how healthy food financing policies might influence the community food environment. However, one downside of the SEF is that I was unable to determine which level had the most impact on F&V access and intake. Future research should focus on teasing out and isolating factors in the various SEF levels to see which has the greatest impact on intake.

For my future research, I plan to reanalyze data from Study 2, comparing the predictive power of GIS and self-reported data for estimating the association between F&V access and consumption. Once all the baseline data is collected from the Green Cart Survey, I should have a sample size of approximately 340 individuals, which might offer more information about the predictive power of GIS-based measures versus self-reported perceived access measures. Additionally, with a larger study sample size, I would like to further examine which measure, participants' perceived access or affordability, has a greater impact on F&V intake among participants receiving government assistance compared to those not receiving assistance. Last, if given the funding opportunity, I would redo the Green Cart Survey's study design so that the dependent variable, measuring daily F&V consumption, focuses only on *fresh* F&V consumption, and not canned or frozen. Re-framing this question will allow me to reduce the threat of under- or overestimating the relationship between perceived access and fresh F&V intake.

In terms of future research on access to healthy food state legislation, researchers should consider analyzing all years of access to healthy food legislation to examine possible policy trends, including rates of enactment, legislation content, stakeholder messaging, and possibly preemption laws. One issue that has arisen in several states are preemptive laws that prohibit local governments from passing restricting legislation, such as taxing SSBs or

regulating the drink size or location of where SSBs or snacks are sold. It is possible that different stakeholder groups and/or different messages may have been used in preemption legislation than in other healthy food state legislation. In regard to stakeholder messaging, more research is needed to determine what value-laden messages are most effective in expanding or restricting legislation, such as understanding which value-laden messages successfully counteract the food industry's messaging about personal responsibility and freedom of choice. Because public health research is starting to reveal (1) the addictive properties of sugar and (2) the food industry's marketing practices of advertising unhealthy products to minorities and youth, more research on public health messaging could be helpful to public health advocates and policymakers.

Next Steps

I plan to submit all three studies to peer-reviewed journals for publication. The first study, low-income individuals' perceptions of how F&V access programs can improve consumption, will be submitted to the Journal of Nutrition Education. The second study, determining the effectiveness of GIS-based measures and self-reported perceived access measures for estimating the association between F&V access and consumption, will be submitted to the Journal of Health and Place. The last study, analyzing stakeholder arguments in access to healthy food state-level legislation, will be submitted to the Journal of Public Health Law & Policy.

APPENDIX: FOCUS GROUP MODERATOR GUIDE: ORANGE AND DURHAM COUNTIES

Individual-Level Questions

1. Are you able to buy and prepare as many fruits and vegetables as you would like for yourself or your family?
 - a. What makes it harder?
 - b. What would make it easier?

Probe: Distance, knowledge of how to prepare foods, cooking equipment

Community-Level Questions

2. Where do you most often buy fresh F&V?
 - a. Why do you buy F&V at this location?
 - b. What is most important to you when choosing F&V?

Probe: How important is it that your produce be from North Carolina farms? How important is it that your produce be organic or grown without chemical or pesticides?
3. Would you like to see more options in your community for purchasing fresh F&V?
 - a. What types of programs would help you to eat more F&V?

Policy-Level Questions

1. The Carrboro Farmer's Market is a group of farmer's and producers who sell fresh fruits, vegetables and other food directly to consumers. Last year the **Carrboro Farmer's Market** started accepting EBT cards (also known as SNAP or Food Stamps).

Community-Level Questions

2. How much interest would the people in your community have in purchasing food at the farmer's market?

Probe: Why would they like it? Why would they not like it?

 - a) What would make it more likely for people to use the Farmer's market?

Probe: Longer hours, different days, different location, better transportation?
3. In addition to the farmer's market some people have suggested the idea of a **Veggie Van** that would deliver bags of fresh, local and organic fruits and vegetables to different schools and community organizations such as [your organization]. Each week there would be different fruits and vegetables in the bag, but everyone who gets a bag would get the same thing.

Individual-Level Questions

- a) How much interest would the people in your community have in a veggie-mobile at [this site] or another?

Probe: Why would they like it? Why would they not like it?
- b) What would make it more likely for people to use the Veggie-mobile?

Probe: Having recipes, cooking demos, being able to select the produce you want

Community-Level Questions

4. Community Gardens provide shared space for people to grow fruits and vegetables.
 - a) Does your neighborhood have a community garden? If so, do you use your neighborhood's community garden? Why or why not?
 - b) How much interest would the people in your community have in using a community garden if one was set up in your community?
 - c) What would make it more likely for people to use the community garden?
Probe: location, gardening lessons, cost of use, tools or plants provided
5. Are there other ideas that you have for helping people to eat more fruits and vegetables or other healthy foods?
6. What is the best way to promote the farmer's market, veggie-mobile or restaurant in your community?
7. Is there anything else you would like to share with us?

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