Stakeholders' Views about the Benefits, Challenges, and Opportunities of Primary Schools to Implement Farm to School Programs for Children in Southwestern Virginia

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Abstract

Research suggests school-based interventions and health education programs can increase children's fruit and vegetable exposure and consumption to improve their diet quality and reduce the risk of diet-related chronic diseases during adulthood. Nevertheless, children have limited availability and access to fruits and vegetables in school environments, which is a barrier to healthy eating. Farm to school (FTS) programs are one of many synergistic interventions to increase children's intake of locally and regionally produced fruits and vegetables at school. In 2015, the United States (U.S.) Department of Agriculture reported that 42% of U.S. school districts and 57% of Virginia schools participated in FTS programs. However, there is a lack of research on FTS programs in Montgomery County, Virginia. This MS thesis describes a mixed-methods, Q Methodology study to explore the views of diverse stakeholders (n=14) regarding the benefits, opportunities, and challenges to implement FTS programs for children, aged 5-11 years, in primary schools in Montgomery County, Virginia. Objective 1 was used to identify and mapped stakeholders invested in or affected by FTS programs in Virginia. Objective 2 used Q Methodology and factor analysis to identify the views of stakeholders regarding the benefits, opportunities, and challenges of FTS programs in Montgomery County. Results found two factors that summarized all 14 participants' viewpoints. Factor one (n=12), *Appreciators of Child-Centered Benefits* and factor 2 (n=2), *Advocates for Legislative Change.* Objective 3 described policies and future actions needed to institutionalize and sustain FTS programs in Montgomery County and southwestern Virginia.

Abstract (General Audience)

Research suggests school-based interventions and health education programs can increase children's fruit and vegetable exposure and consumption to improve their diet quality and reduce the risk of diet-related chronic diseases during adulthood. Nevertheless, children have limited availability and access to fruits and vegetables in school environments, which is a barrier to healthy eating. Farm to school (FTS) programs are one of many synergistic interventions to increase children's intake of locally and regionally produced fruits and vegetables at school. In 2015, the United States (U.S.) Department of Agriculture reported that 42% of U.S. school districts and 57% of Virginia schools participated in FTS programs. However, there is a lack of research on FTS programs in Montgomery County, Virginia. This MS thesis describes a mixed-methods, Q Methodology study to explore the views of diverse stakeholders (n=14) regarding the benefits, opportunities, and challenges to implement FTS programs for children, aged 5-11 years, in primary schools in Montgomery County, Virginia. Objective 1 identified and mapped stakeholders invested in or affected by FTS programs in Virginia. Objective 2 used Q Methodology and factor analysis to identify the views of stakeholders regarding the benefits, opportunities, and challenges of FTS programs in Montgomery County. Results found two factors that summarized all 14 participants' viewpoints. Factor one (n=12), *Appreciators of Child-Centered Benefits* and factor 2 (n=2), *Advocates for Legislative Change.* Objective 3 described policies and future actions needed to institutionalize and sustain FTS programs in Montgomery County and southwestern Virginia.

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Acronyms and Abbreviation

BMI	Body Mass Index
CATCH	Coordinated Approach to Child Health
CDC	Centers for Disease Control and Prevention
CFA	Community Focused Agriculture
CSA	Community Supported Agriculture
DGA	Dietary Guidelines for Americans
DoE	Department of Education
FDA	Food and Drug Administration
FTC	Federal Trade Commission
FFVP	Fresh Fruit and Vegetable Program
FTF	Farm to Fork
HHS	U.S. Department of Health and Human Services
HEI	Healthy Eating Index
NHANES	National Health and Nutrition Examination Survey
NSLP	National School Lunch Program
SBP	School Breakfast Program
SNAP	Supplemental Nutrition Assistance Program
VDACS	Virginia Department of Agriculture and Consumer Services
US	United States
USDA	United States Department of Agriculture
WIRB	Western Institutional Review Board

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Chapter 1 Introduction

I. Background and Rationale for the Research

The Dietary Guidelines for Americans 2015-2020 recommend that all people in the United States (U.S.) follow a healthy eating pattern across the life span to promote a healthy weight and reduce the risk of diet-related chronic diseases.[1] A healthy diet includes adequate amounts of fruits, vegetables, whole grains, low-fat dairy, and lean proteins.[1] Currently, a majority of American children and adults do not consume the recommended quantity of foods in these categories, especially fruits and vegetables. In 2015, the Centers for Disease Control and Prevention (CDC) reported that only 12.2% and 9.3% of American adults meet the daily fruit and vegetable intake recommendation of 2 cup equivalents and 2.5 cup equivalents, respectively.[2] These deficits undermine diet quality and can negatively affect children's growth and development.[3] Furthermore, adequate fruit and vegetable intake is correlated with a decreased risk of diet-related chronic diseases associated with the leading causes of death such as cardiovascular diseases, diabetes, stroke, and diet-related cancers (e.g., colorectal cancer).[2,4] Efforts are needed to combat the obesity epidemic and diet-related chronic diseases in children that contribute to future U.S. morbidity and mortality rates. Many studies have found that interventions, especially those targeting children and families that increase fruit and vegetable intake may help to improve weight management and decrease chronic disease risks.[4,5]

The U.S. Department of Agriculture's (USDA) school meals programs, including the National School Lunch Program (NSLP) and School Breakfast Program (SBP), are important avenues to increase fruit and vegetable intake among children and adolescents. Implementing farm to school (FTS) programs within NSLP and SBP can increase the availability of locally or regionally

produced fruits and vegetables for children. FTS programs started in California in 1996 to incorporate locally or regionally produced foods (i.e., fruits, vegetables, dairy products and meats) into the NSLP.[6] The U.S. National Farm to School Network has reported that the number of FTS programs in the U.S. has grown over the past two decades with 42% of US schools now utilizing FTS programs. FTS program reach continues to grow as schools procure local and regional products for school meals that also benefits farmers.[7] In recent years, schools have utilized multi-dimensional approaches to implement FTS programs, which include using agricultural and nutrition education curricula to improve students' efficacy and knowledge about the importance of eating fruits and vegetables for a healthy diet, and to support the economic viability of local agriculture.[6] Students can gain an enriched FTS experience when they are involved in the growing and harvesting of produce in school gardens, and visiting local or regional farms throughout organized farm tours.[6]

II. Research Goals and Questions

FTS programs are defined, by the National Farm to School Network as "An act that connect schools and local farms with the objective of serving healthy meals in school cafeterias, improving student nutrition, providing agriculture, health and nutrition education opportunities and supporting local and regional farmers."[7] FTS programs have been shown to effectively increase fruit and vegetable consumption among children, yet only 42% of U.S. schools formally participate in FTS programs.[7] In 2015, 57% of schools in Virginia utilized FTS programs or activities. Yet Montgomery County is among 19 other agricultural counties in southwestern Virginia that do not formally participate in FTS programs or activities.[8] While there may be informal FTS activities underway, research is limited on FTS programs in primary schools in

Montgomery County. Therefore, this MS thesis sought to explore the views of diverse stakeholders about the benefits, opportunities, and challenges of implementing a sustainable FTS program in Montgomery County, Virginia.

Substantial evidence exists to support the effectiveness of FTS programs to increase fruit and vegetable exposure and intake among school-aged children.[6,9] Furthermore, existing research supports that local or regional produced foods have increased nutrient quality and provide benefits to local and regional farmers and local economies.[10,11] FTS programs are often not designed and implemented to maximize their fullest potential, for example, coinciding curricula are not always implemented along with FTS programs. Optimizing FTS programs is increasingly important considering that the research suggests that health behaviors are more positively affected with FTS programs are implemented with a curriculum. Based on data collected in schools, lack of access has been identified as a primary barrier to their ability to consume adequate amounts of recommended fruits and vegetables.[9] Parents or caretakers, school staff, farmers, and state government agency staff and state legislators are all instrumental stakeholders who can help to implement and sustain FTS programs. Based on a review of the literature in Chapter 2, there is a knowledge gap about the views of diverse stakeholders in relation to FTS programs and program implementation in Southwestern Virginia. As shown in the FTS Map of Virginia, included within this proposal, there are a limited number of FTS programs in southwestern Virginia. The purpose of this MS thesis was to understand the interests, attitudes, beliefs and values of these stakeholders to provide useful information to guide the future design and implementation of FTS programs at primary schools in Montgomery County, Virginia. This MS thesis sought to answer three specific research questions (RQ) described below.

RQ 1: Who are the important stakeholders invested in or affected by FTS programs in the Commonwealth of Virginia?

Objective 1: Identify and map important stakeholders invested in o affected by FTS programs in the Commonwealth of Virginia.

RQ 2: What are the views of diverse stakeholders (i.e., parents, caretakers, teachers, school nutrition staff, school principals, farmers, state government agency staff and state legislators) regarding the benefits, opportunities, and challenges of six primary schools to implement a FTS program in Montgomery County, Virginia?

Objective 2: Identify the views of diverse stakeholders regarding the benefits, opportunities, and challenges of six primary schools to implement a FTS program in Montgomery County, Virginia.

RQ 3: What future policies and actions can be taken by diverse stakeholders to institutionalize and sustain FTS programs in Montgomery County and southwestern Virginia?

Objective 3: Identify and disseminate potential future policies and actions to be taken by diverse stakeholders to institutionalize and sustain FTS programs in Montgomery, County and southwestern Virginia.

III. Contribution of this Research

This research provides useful insights for schools and institutions that seek to implement FTS programs in southwestern Virginia. The results of this thesis will provide decision makers in Montgomery County, Virginia with critical information to help identify strategies that require buy-in to support FTS programs from influential groups. Furthermore, understanding the current

views of these stakeholders related to FTS programs, and their perceived benefits and challenges, will help tailor intervention strategies to fit the needs of the community, identify and utilize existing resources to initiate a FTS program in the county. Finally, by identifying policy interventions, actions can be guided to institutionalize effective and sustainable FTS programs in Montgomery County, Virginia. The results from this research could be used by primary school staff that are exploring how to implement a FTS program in Montgomery County and other neighboring rural counties in the Southwestern region of Virginia.

IV. Research Timeline

This MS thesis was proposed to my committee in September 2018. This MS thesis was submitted to Western Institutional Review Board for review and approval in October of 2018. WIRB determined this study was fit for exemption and issues a Determination of Exemption letter on October 24, 2018. The study recruitment took place from November 2018 through February 2019. The data was analyzed, interpreted and summarized in this MS thesis by April 2019, and the results will be presented to my MS committee on May 2, 2019.

Chapter 1 References

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Chapter 2 Literature Review

This literature review summarizes research that addresses the following topics: (1) overweight and obesity prevalence and trends; (2) etiology of overweight, obesity, and diet-related chronic diseases; (3) characteristics of a healthy diet and healthy eating patterns; (4) Fruit and vegetable consumption trends among U.S. children and adults; (5) seasonal and regional diets; (6) farm to fork and farm to table movements; (7) the FTS movement and incorporation of local and regional foods into nutrition programs; (8) economic, educational, and health benefits of FTS programs; (9) policies to promote FTS and FTF programs; (10) FTS programs in Virginia; and (11) conclusions and knowledge gaps to inform this MS research.

2.1 Overweight and Obesity Prevalence and Trends

Worldwide, obesity is the fifth leading cause of death with over 2.8 million deaths each year. Many of the leading causes of death include chronic diseases that are attributed to overweight and obesity.[1] The World Health Organization classifies overweight and obesity as major risk factors for heart disease, diabetes, musculoskeletal disorders, and some cancers including endometrial, breast, and colon cancer.[1] A person who is overweight or obese has a significantly increased risk for developing these chronic diseases. The prevalence of these comorbidities makes addressing obesity a priority for public health professionals.

Overweight and obesity are leading health concerns for a majority of Americans. For children, overweight is defined as a weight between the 85th and 94th percentile on the Centers for Disease Control and Prevention's (CDC) BMI growth chart, and obese is defined as a weight at or above the 95th percentile.[2]

The incidence and prevalence of overweight and obesity among children, adolescents and adults has risen in the U.S. since the early 1980s, and continued to rise in most age groups (except young children, aged 2-5 years) through 2017.[3] Adult obesity rates have followed a similar trend with the average U.S. obesity rate at around 10% in 1990 and 39.8% in 2016.[4,5] This equates to the average adult weighing 26 pounds more today compared to 1962.[6]

In 2014, the National Health and Nutrition Examination Survey (NHANES) data showed that more than two thirds (70.7%) of American adults were overweight or obese and about one third (32.4%) of American children and adolescents, aged 2-19 years, were overweight or obese.[3,7] The 2015-2016 NHANES data showed the distribution of overweight and obesity prevalence among different age groups, and reported that obesity prevalence was higher in American adolescents, ages 12-17 years (20.6%) than children aged 6-11 years (18.4%) and young children aged 2-5 years (13.9%).[8] Trends in obesity prevalence show an increase among children and adolescents over nearly a decade from 16.8% in 2007-2008 to 18.5% in 2015-2016.[9] Furthermore, the 2015-2016 NHANES found that more than two thirds of American adults were either overweight or obese and nearly one in five children and adolescents were obese (18.5%).[5] The prevalence of Americans who are overweight or obese continues to rise and has led policymakers to identify this issue as a public health epidemic.[6]

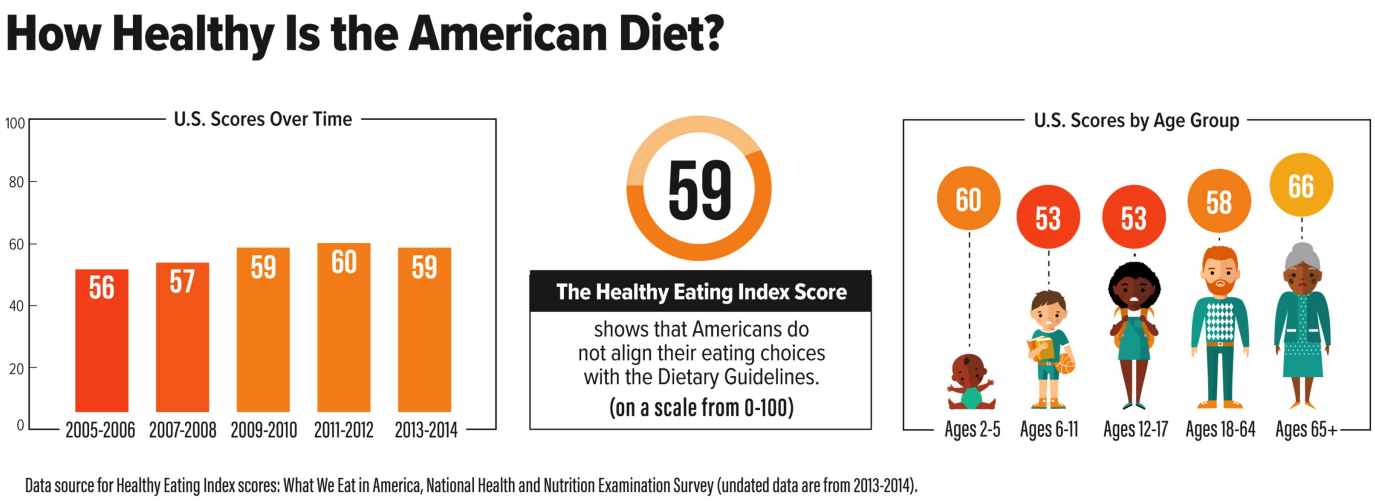
2.2 Etiology of Overweight, Obesity, and Diet-Related Chronic Diseases

Many specific factors or determinants have contributed to the steady rise in Americans who are overweight and obese. Societal, social, lifestyle changes and unhealthy environments that have become part of culture are all linked to the obesity epidemic. The regular consumption of large

portions of energy-dense and nutrient-poor fast foods and sugar-sweetened beverages has become a regular part of many people's diets. Highly processed convenience foods and sugar-sweetened beverages that Americans purchase at major food retailers, chain restaurants, and other venues often have excessive amounts of calories, total fat, saturated fat, added sugars and sodium, which are nutrients of concern that contribute to diet-related chronic diseases including type 2 diabetes, heart disease and certain cancers.[10]

The USDA's Center for Nutrition Policy and Promotion has evaluated the quality of the American diet compared to the DGA recommendations using a tool called the Healthy Eating Index (HEI). In 2015, Americans scored an average of 59 out of 100 on the HEI, with variations observed across different age groups (i.e., children and teens scored 53 and adults scored 58) as shown in Figure 2.1.[11] The average HEI score for Americans' diet quality has risen only slightly from 56 in 2005-2006 to 59 in 2013-2014. By addressing this discrepancy, Americans can improve their diet quality and achieve a healthy weight to alleviate the psychological and physiological burdens of diet-related chronic diseases that contribute to morbidity and mortality rates.

Figure 2.1 Trends in the Healthy Eating Index Score of Americans, 2005-2014



Source: Center for Nutrition Policy and Promotion and U.S. Department of Agriculture. *Healthy Eating Index*; 2015.

The marketing of highly processed, low-nutrient, energy-dense foods and beverages is also a contributing factor to the rapid rise in overweight and obese individuals. The Federal Trade Commission (FTC) acknowledged that the marketing of foods and beverages to children can have a significant impact on their eating behaviors, and should be done in a responsible manner.[12] Current food and beverage marketing practices aimed at children promote excessive amounts of high-sugar, high-fat, high-sodium, and low-nutrient food and beverage products that contribute to the rising rates of children who are overweight or obese.[12] As shown in Figure 2.1, the food marketing expenditures of 48 companies in 2009 across ten food and beverage categories was significantly higher for energy-dense products than these companies' expenditures on promoting fruits and vegetables. Food marketing socializes children to view energy-dense, nutrient-poor foods and beverages as culturally acceptable. In order to increase fruit and vegetable

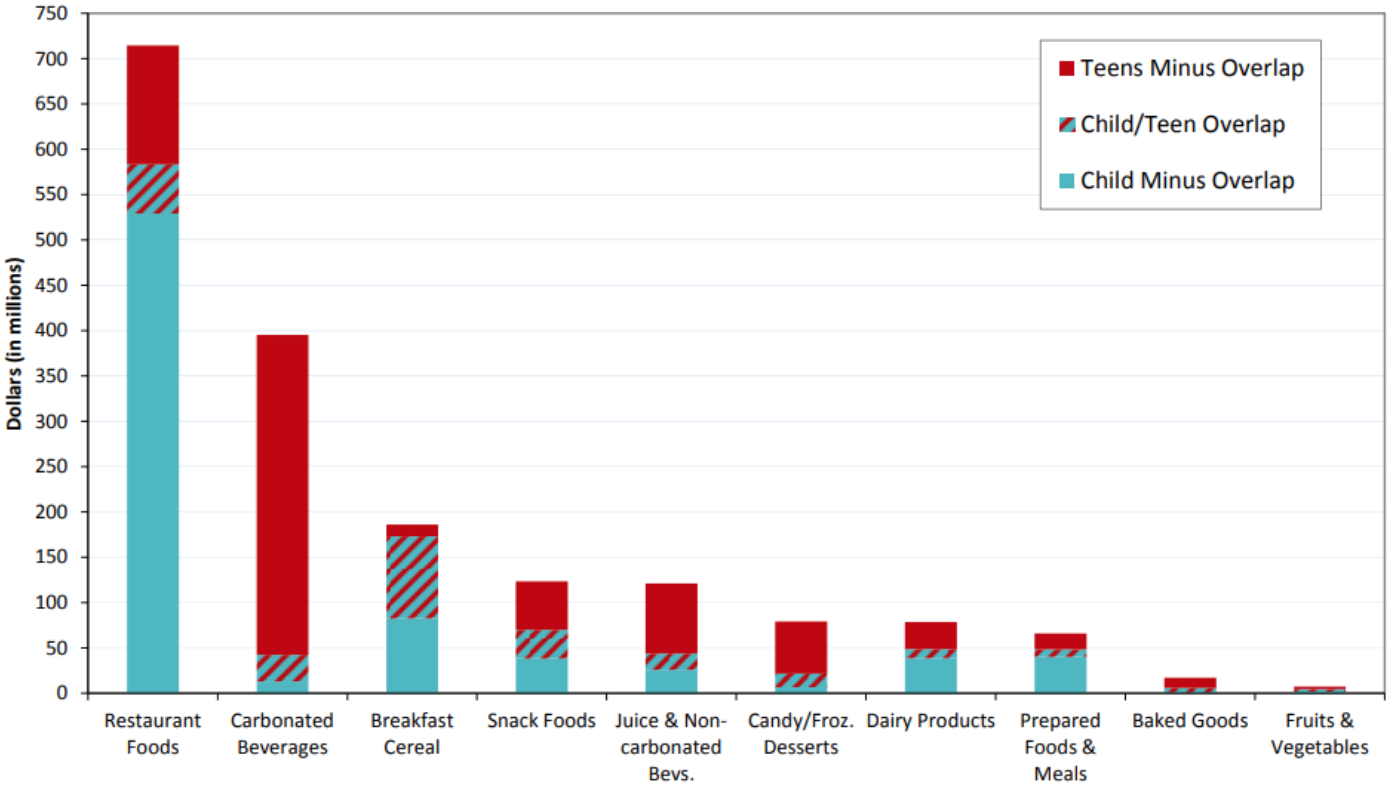
consumption the federal government should investment in the marketing of healthy goods and beverages instead of marketing energy-dense and highly processed food and beverage products to young people.

Bauer et al. 2012 analyzed the energy content of items at the leading fast food restaurants including McDonalds, Burger King, Wendy's, KFC, and Taco Bell. They found that the energy content of items remained fairly constant over 14 years, despite voluntary efforts by restaurants, and legislation that has encouraged healthier options for customers.[13] While the energy content per item remained the same, the fast food restaurants examined in the study averaged a 53% increase in the number of menu items over 14 years.[13] These findings are significant because increased menu options has been shown to increase food purchased and consumed as suggested by studies that found that the children consumed an average 733 calories at fast food restaurants.[14,15] Bauer et al. 2012 suggest that the rise in the amount of options available has contributed to poor diet quality and declining health outcomes.

Given the wide availability of highly processed, readily available convenience foods and beverages, it can be a challenge for Americans to select and consume a nutrient-dense diet high in fruits, vegetables, whole grains, lean proteins, and low-fat or non-fat dairy products that are components of healthy eating patterns. Although, it is important to note that the relationship between fruit and vegetable consumption and obesity is not well supported by existing evidence.[16] Most research has not shown a positive, direct correlation between either fruit and vegetable consumption and a healthy weight, or low fruit and vegetable intake and high BMI levels. However, research is more robust to support the relationship between increased fruit and

vegetable consumption and reduced risk of diet-related chronic diseases such as type 2 diabetes, heart disease and certain cancers.[16,17]

Figure 2.2 Child and Teen Directed Marketing Expenditures in 2009



Note: The portion of marketing that meets both the child and teen criteria is labeled Child/Teen Overlap.

Source: Leibowitz J, Rosch JT, Ramirez E, Brill J, Ohlhausen M. *A Review of Food Marketing to Children and Adolescents*. Federal Trade Commision. Washington, DC: US; 2012.

The National Institute of Child Health and Human Development has researched environmental factors that impact the health status of Americans such as access to parks, sidewalks and affordable gyms, and food advertising, which may contribute to unhealthy weight gain.[18] Efforts

to educate adults and children on aspects of a healthy diet and lifestyle changes need to continue to combat the obesity epidemic and the consequential chronic disease comorbidities.

Daily physical activity is another important aspect of weight status. The Physical Activity Guidelines for Americans recommend that children and adolescents ages 6-17 years should engage in at least 60 minutes daily of moderate-to-vigorous physical activity.[19] With only one in three children being physically active every day, physical inactivity is another contributing factor to the increased proportion of children and teens who are overweight or obese.[19] Physical activity can help people maintain an energy balance in order to avoid weight gain. Physical activity also helps to establish lean muscle mass, which contributes to a healthy weight status. Additionally, as Americans rely more on motorized travel with cars and automated services, environments are not designed to support an active lifestyle that fosters physical activity into one's daily life.

2.3 Characteristics of a Healthy Diet and Healthy Eating Patterns

A diet that is abundant in nutrient-rich foods improves diet quality for children and adults. The literature supports that children and adults benefit physically and cognitively from a general sense of well-being when they consume a nutritionally balanced diet.[20] The U.S. Department of Health and Human Services (HHS) and USDA's 2015-2020 Dietary Guidelines for Americans (DGA) recommends a healthy eating pattern that includes a variety of vegetables and legumes, whole fruit, whole grains, fat free and low-fat dairy, lean proteins and plant-based oils.[21] The DGA 2015-2020 also recommend that Americans limit their added sugar intake to less than 10% of total energy, eliminate *trans* fats, substantially reduce their total fat, saturated fats, and sodium

intake.[21] The DGA encourage all Americans to consume a primarily plant-based diet high in fruits, vegetables, whole grains, and lean sources of protein to protect against chronic diseases are the leading causes of U.S. morbidity and mortality.[22]

Regardless of the mounting evidence that supports the benefits of a healthy and balanced diet, Americans struggle to consume the recommended daily amounts of fruits and vegetables. In 2015, approximately 9.3% of Americans consumed the recommended 2.5 cup equivalents of vegetables daily and approximately 12.2% of Americans consumed the recommended 2 cup equivalents of fruit daily.[23] Without significant efforts to increase the diet quality of Americans, the objectives set forth by Healthy People 2020, national objectives to improve the length and quality of American's lives, will not be met.[24] The specific objectives that set standards for improving diet quality include increasing the contribution of vegetables to the population's diet, increasing the contribution of whole grains to the population's diet, reducing consumption of solid fats, and reducing consumption of added sugars, in addition to 20 other objectives.[25]

While current U.S policies and programs focus on health behaviors as separate from environmental issues, Neff et al. 2015 suggests that considering a more holistic approach to environmental and health problems may be more effective.[26] A systems approach that addresses health and environmental concerns can inspire new ideas that are dynamic in nature to help shift policy to be the most effective.[26] Neff et al suggest FTS programs are one of many strategies to implement a systems approach that can influence people and communities' to eat locally and improve the diet quality of children in school environments.[26]

2.4 U.S. Fruit and Vegetable Consumption Trends Among Children and Adults

Consuming an adequate amount of fruits and vegetables is protective against diet-related chronic disease such as certain cancers and heart disease.[17,22,27] Despite the significant evidence supporting the benefits of adequate fruit and vegetable intake, many developed countries still fall below recommended values, including the US, notwithstanding the fact that fruits and vegetables are widely available year round, which is a luxury that has not always existed.[22] The CDC's 2015 Behavior Risk Factor Surveillance System data showed that 76% of Americans did not meet the fruit intake recommendation and 87% of Americans did not meet the vegetable intake recommendation.[28] Furthermore, the CDC's Youth Risk Behavior Survey System has collected data every two years since 1991, which allows the comparison of dietary behaviors over the past 26 years. As of 2017, only 18.8% of children ate whole fruit and/or drank 100% fruit juice three of more times per day, which is a decrease since 1991. Additionally, only 13.9% of children ate vegetables three of more times per day, which has not changed since 1991.[29]

The CDC recognizes that the lack of fruit and vegetable consumption increases the risk of chronic diseases.[28] The most commonly eaten fruits and vegetables include potatoes, tomatoes, lettuce, and oranges, which tend to be consumed in a highly processed state. For example, most potato consumption occurs in the form of French fries and chips, and a portion of tomato consumption is accounted for with ketchup, and tomato sauce and oranges are most commonly consumed as juice.[30] Consuming produce in a highly processed state does not yield the nutrient quality and support diet quality associated with consuming fresh fruits and vegetables. The CDC suggests that targeting children to promote fruit and vegetable intake could help make sustainable changes to the nation's average fruit and vegetable consumption.[28] A recent scoping

review published found several factors that had consistent positive associations with elementary school children's fruit and vegetable consumption during school lunch. These factors include: older children, serving sliced fruits, serving vegetables first, allowing more time for eating, using incentives and social marketing or nutrition education curricula, and following the updated nutrition standards from the 2010 Healthy Hunger-Free Kids Act.[31]

While a majority of Americans do not meet the DGA recommendations for fruits and vegetables there is variation from state to state and even across nationalities, depending on socioeconomic factors, suggesting diet and health disparities. The CDC's 2015 Morbidity and Mortality journal published a paper on income to poverty ratio. This data helped determine disparities with access and cost identified as the most commonly perceived barriers to acquiring healthy foods.[32] Beyond income level, education is associated with diet quality. One study showed a positive correlation between education level and vegetable consumption. The higher the education of an individual, the higher their consumption (and their family's consumption) of non-tomato, non-potato vegetables.[30] To standardize access to produce, the CDC lists farm to institution programs (i.e., schools, daycares, restaurants, hospitals) as an important strategy to improve access and availability of produce to children, adolescents, and adults.[32] Considering the recommendations of the CDC FTS programs provide a powerful intervention avenue that would be effective and efficient.

2.5 Defining Seasonal and Regional Diets

Historically, diet quality was influenced by the seasonality of foods, particularly produce, and the tendency for people to eat certain types of food depending on the season. Nonetheless, the

literature shows varying evidence whether nutrient availability and actual nutrient composition of diets is dependent on season in present day diets. Marti-Soler et al. 2017 examined the prevalence of different macro and micronutrients in the diets of 44,000 participants in a study conducted in France, New Zealand, Russia, and Switzerland from 1993-2012. This study found that over the course of 19 years, seasonal variation declined so that the nutritional composition of diets became increasingly constant throughout the year and continue to become more stable and has less seasonal variety over time.[33]

Prior to the rise of importing and exporting goods, the shift to transportation infrastructure, and modern refrigeration, dietary patterns revolved around the seasons. Foods that could be dried or preserved were saved for winter such as beans, winter squash, tubers, and grains. In modern day though, humans are not limited by seasonal dietary patterns and are free from the food-related limitations of their geographic location as well. The scientific advances and technological advances in transportation and preservation that have allowed humans to grow and import goods year-round have liberated American's diets, enabling access to produce year round.

Despite the lack of utilization of the availability of fruits and vegetables, the expectation of the availability of fruits and vegetables year-round creates a barrier for the local-foods movement. Likewise, schools that participate in the National School Lunch Program are required to offer a variety of fruits and vegetables, most of which would not be available if schools were totally dependent on locally or regionally produced food. Considering the growing local-food movement, and the implementation of more FTS programs, socializing school children to understand the concept of seasonality may help FTS programs success.

2.6 Farm to Fork and Movement

The farm to fork (FTF), or farm to table movement (here forth referred to as FTF) has grown significantly in the U.S. over the past 30 years and continues to grow.[34] The FTF movement gained public interest over 50 years ago, as seen in the timeline shown in Figure 2.3.[34] The FTF movement promotes traceable food sourcing for restaurants and institutions. FTF also works toward increasing purchases of food from the primary source, rather than having middlemen to distribute food and is economically and environmentally sustainable for consumers and producers.[35] Barriers exist within this movement though. Sourcing from small farms requires higher prices at restaurants and institutions and makes local food financially inaccessible for some people. Additionally, the ability of small farms to scale up to meet a larger demand can create a barrier for local food consumption. Furthermore, 'local' or 'regional' have been defined differently and may mean within a state, or within a certain distance of production. A clear definition is lacking for 'local' or 'regional', that allows some restaurants to exploit customers by promoting meals as locally produced that may not for the USDA guidelines.[35] The USDA, through the U.S. Farm Bill Legislation, defines local as foods grown within the same state, territory, or tribal land, or being transported less than 400 miles.[36] The Virginia Department of Agriculture and Consumer Services (VDACS) defines local in three tiers; produced within a county, within a region or within the state.[37]

In Virginia, FTF programs have been implemented in a variety of areas to promote the abundance of locally and regionally produced foods. In 2003 and 2007, the Food Marketing Institute conducted surveys to establish reasons for Americans buying local or regional foods. Both surveys revealed improved freshness, support for the local economy, and food traceability

as the main motivators for consumers to purchase local or regional products.[35] Research has shown other benefits of sourcing local foods. Sourcing directly from farmers enables them to secure a greater profit. In America, the average farmer earns approximately $0.148 of the food dollar.[38] In other words, farmers retain approximately 14.8% of total profits from the food they produce. Sourcing locally increases the profits to the farmer and the percent of the food dollar retained within the local community. When sourcing from a local or regional vendor, 65% of the dollar is retained within the local community as opposed to 40% when products are sourced from chain retailers.[35] Furthermore, eating, purchasing, and sourcing local and regional foods also can help reduce the carbon footprint of foods due to decreased travel times and distances, and support more environmentally-friendly growing practices. Lastly, psychological and social benefits are associated with participating in farmers markets and other avenues for purchasing local goods largely due to the strong community aspect associated with these avenues of purchasing.[35] The overwhelming economic, health, and psychological benefits of purchasing and consuming locally grown foods provides justification for movements such as FTF and FTS.

The History of the Farm to Table Movement

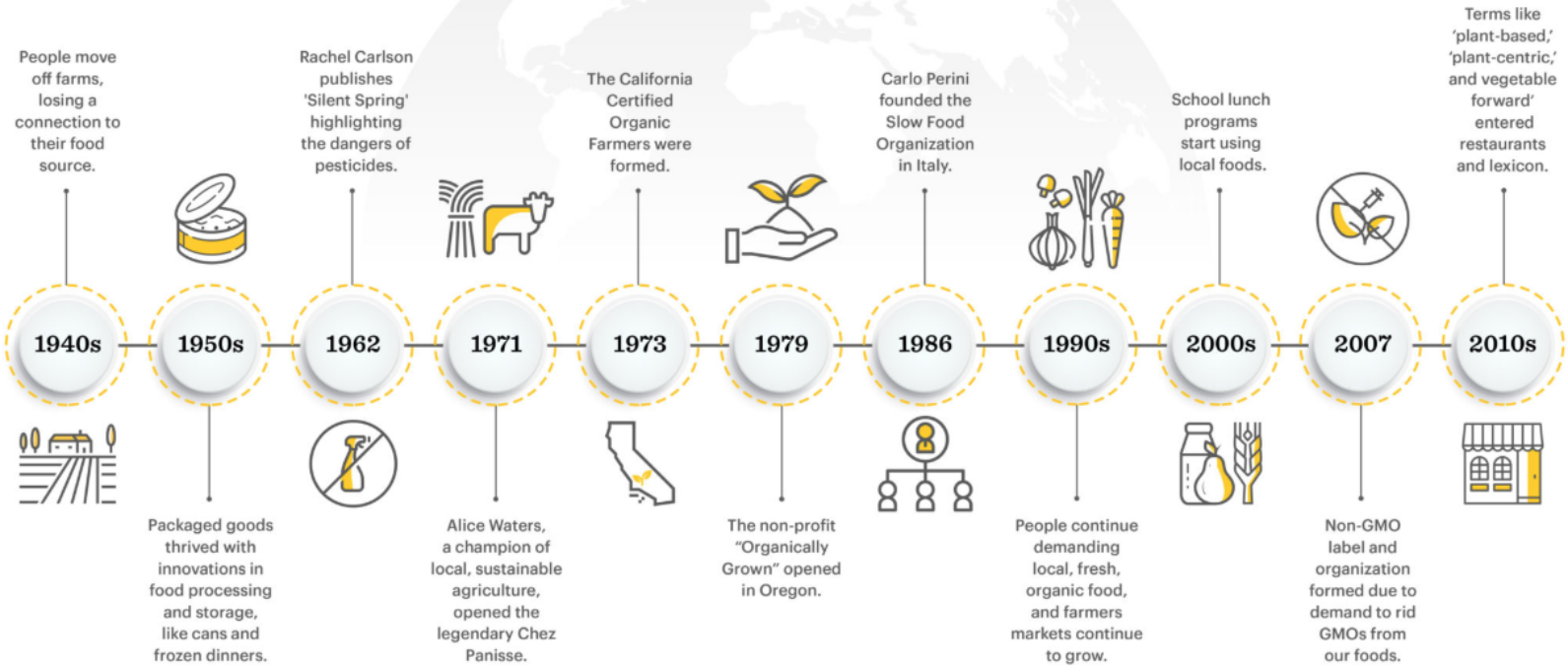


Figure 2.3 The History of the Farm to Fork Movement

Source: Janzer C. The history of the farm to table movement. Upserve. 2018.

2.7 FTS Movement and Incorporation of Local and Regional Foods into Nutrition Programs

FTS programs began in 1996 with pilot programs in California to highlight local produce, meats, and eggs while incorporating an agriculture, nutrition, and/or environmental curriculum into schools.[39] In addition to the nutrition and educational aspects, FTS programs also provide economic benefits to localities, which are expanded upon below.

With school being an integral part of a child's day, utilizing this time to instill health behaviors has been identified as an effective intervention strategy. The Academy of Nutrition and Dietetics has evaluated the available evidence and supports integrated nutrition programs from preschool through high school, including FTS programs, as the most effective strategies to improve student's health.[40] In a systematic review, which included 22 outcome evaluations, researchers

tried to determine barriers and facilitators to healthful eating in young people. The research found that among young people's perceptions, limited healthy options at school was perceived as the primary barrier.[20] Furthermore, a study examined the difference of fruit and vegetable availability in schools with and without FTS programs. Researchers found that schools that had implemented FTS programs offered more fruits and vegetables in their school menus. Beyond participating in FTS programs, the study also examined the affect of FTS legislation on fruit and vegetable availability in school. In states where laws support FTS programs, and a FTS program exists, 70.59% of schools offered fruits and vegetables most or every day. In states where FTS programs were not supported by legislature, and schools did not include FTS programs, only 48.51% of schools offered fruits and vegetables most or everyday.[41] Another study examined the influence of FTS laws and local procurement laws on primary FTS programs. This study coded states based on whether they had 1) formal laws that require schools to have FTS programs, 2) locally grown procurement laws that require/encourage purchasing local produce/products, but do not require or mention FTS programming, or 3) no laws pertaining to local procurement or FTS programs. The percentage of schools in states with formal FTS laws increased 13.2% from 2007 to 2009.[42] Furthermore, the percentage of states that held local procurement laws increased to 30% by 2009. This study also found that schools were significantly more likely to have FTS programs in states with FTS and local procurement related laws as opposed to schools in other states.[43]

Beyond legislative support for FTS programs, the interdisciplinary nature of FTS programs requires that all stakeholder groups work together in unison towards the common goal of sustaining a FTS program. Ratcliffe, 2012 points out that FTS program implementation rarely

follows a systematic implementation process and commonly utilizes different groups of people including nutrition services, food producers, and educators. [44] In order to synchronize the different groups of people essential for FTS program implementation, Ratcliffe suggest the utilization of a systematic logic model in order to help actors understand their shared goal.[44] Furthermore, Ratcliffe explains that a logic model will help those involved in implementation understand the greater goal of reducing childhood obesity.[44]

While there is room for additional research, multiple studies have found that fruit and vegetable consumption increases among children who participate in a curriculum that is implemented alongside a FTS program.[45] Moss et al. 2013 studied schools that implemented the Coordinated Approach to Child Health (CATCH) as well as farm visits into their curriculum alongside a FTS program.[45] The study sought to answer three main questions: How does CATCH affect nutrition knowledge of primary students? Does nutrition knowledge affect primary school children's fruit and vegetable consumption? Do farm tours affect primary student's fruit and vegetable consumption? Ultimately, researchers found that the implementation of CATCH improved fruit and vegetable consumption among primary school children and that nutrition knowledge was correlated with increased fruit and vegetable consumption.[45] Self-reported fruit and vegetable intake was not significantly increased after farm tours, but, plate-waste analysis showed that students ate more of the produce served at school meals after the farm visits.[45] Overall, implementing CATCH or a similar nutrition education curriculum simultaneously with a FTS program increased fruit and vegetable consumption and overall nutrition knowledge of elementary-aged school children.

Other attempts at increasing fruit and vegetable consumption in schools include the USDA's fruit and vegetable requirement through the school meals program. The USDA requires that children chose fruits and vegetables at school lunch in order for that meal to be eligible for reimbursement, an important portion of income for schools participating in the NSLP and SBP.[46] However, in an attempt to reduce plate waste, schools can now implement offer versus serve, that is, instead of requiring students to take all components to make their meal reimbursable, students can decline certain foods they do not want to eat.[47] This can put a financial burden on schools, as they cannot collect reimbursement for meals that students do not wish to make 'reimbursable'. Moreover, requiring a fruit and/or vegetable at school meals has been shown to slightly decrease consumption and increase plate waste.[46] Hence, an integrative curriculum alongside FTS program implementation may be the best method of reaching the USDA's goal to increase fruit and vegetable consumption among children.

Positive health outcomes are part of the health benefits associated with fruit and vegetable consumption. To date, there has not been any comprehensive research exploring the specific health outcomes of children who have participated in FTS programs. This data would likely be extremely difficult to collect and control for considering the impact of home health behaviors.[48] The health benefits of FTS programs will more likely be seen on state/county levels, in areas that have successfully implemented programs for extended periods of time. Long term, comprehensive research is needed to assess the health outcomes related to the FTS programs. Dooyema et al. 2012 evaluated the impact of different legislation related to health outcomes in school-aged children. In this study, enacted legislation that supported FTS programs was correlated with a positive and measurable reduction in obesity risk among school-aged children.[49]

While this study was conducted in only four states that had implemented FTS legislation, a promising correlation exists between FTS programs and positive health outcomes for children. The significant health behavior outcomes, community-wide impact, and potential health-related outcomes are important evidence to support FTS programs. For FTS programs to continue to grow, Joshi and Ratcliffe, 2012 suggest that FTS program development needs to move from evidence informed and theory-based practices to evidence based practices, which can only be accomplished with data related to health outcomes of children who participate in FTS programs.[50] Joshi and Ratcliffe suggest a causal pathway through which childhood obesity prevention is the goal via FTS programs.[50] Through the pathway program multiple inputs, activities, outputs and effects are measured. As research on FTS programs continues to grow, it is important to create a base of evidence to show the health outcomes gained from FTS programs.

FTS programs also offer a unique avenue to incorporate physical activity and exercise education. Currently, two out of three children are not physically active on a daily basis.[51] While a healthy diet has been shown to protect against chronic diseases, regular physical activity is another factor that helps to reduce the risk of developing chronic diseases. In a systematic review conducted to understand the benefits of physical activity in children and youth, researchers identified 86 published papers that found substantial evidence of the dose-response of physical activity in children. Increased physically activity led to greater health benefits.[52] FTS programs that incorporate a school garden, for example, could utilize gardens as a way to incorporate movement and physical activity for children during the school day while they are learning. While

this may be less practical for large schools, small schools could have each class take care of a small garden or part of a larger garden each day.

FTS programs can be implemented in many ways and throughout many existing programs, and one of the most common avenues of implementation is by incorporating FTS into the NSLP. In 1946, the Richard B. Russell Nation School Lunch Act created the NSLP. Prior to 1946, many states and cities implemented their own versions of the NSLP. Boston and Philadelphia were among the first cities to implement free and reduced institution-provided meals.[53] The program currently provides free and reduced price lunch at school to children who qualify. Students automatically qualify to participate in this program if their household is enrolled in the Supplemental Nutrition Assistance Program (SNAP), the student is enrolled in foster care, is a migrant, or homeless. As of 2015, the NSLP served 30.4 million of U.S. students nationwide and an average of 13.7 million students participated in the SBP each day of the 2014-2015 school year.[54,55]

Beyond feeding children, the program was created to subsidize surplus farm goods. During the Great Depression, families could not afford food (or school lunch) and farmers were not able to sell their goods. The NSLP created an opportunity for the government to buy surplus goods from farmers to provide to schools that participated in the NSLP.[56] The NSLP is funded with subsidies that are distributed to schools as reimbursements for each qualifying meal they sell. A meal qualifies for reimbursement if it follows 'federal meal pattern requirements'.[56] The Healthy, Hunger Free Kids Act requires a school to qualify a meal for reimbursement if it has three of the five components offered, including; dairy, grain, fruit, vegetable, and meat/meat substitute.

However, if only three of the five components are chosen, only one of them can be a vegetable or fruit.[57] With an infrastructure already in place, FTS programs can be implemented within the NSLP and SBP by utilizing local or regional goods or products when they are available.

Decreasing plate waste is a common goal among schools that participate in the NSLP.[56] A study conducted in 2010 used a validated digital photography method to evaluate plate waste of school children from grades 1-8. Of the 899 trays evaluated, less than 50% of middle school and primary school students chose a vegetable with their lunch. The study found that primary school students wasted more than 33% of the fruits, vegetable and whole grains; and middle-school students wasted about 33% of vegetables and about 50% of their fresh fruit. Further, the plate waste results from this study translate into less than 50% of students receiving necessary amounts of vitamin A, C, and iron.[58] With such large amounts of food waste in the NSLP, spending more capital to procure local foods to have them thrown out seems wasteful. Current research shows that when FTS programs are implemented, plate waste is reduced and consumption of fruits and vegetables increases. Kropp et al. (2017) conducted a plate waste study that evaluated more than 11,000 school meal trays, prior to and after, FTS programs.[59] The results showed an increase in selection of fruits and vegetables during meal times in the schools once FTS was implemented. Also, vegetable consumption was significantly increased following implementation of FTS. Fruit consumption was not increased, but researchers suggest these results are due to the majority of the FTS products being vegetables, and labeled as local.[59]

To assist with FTS implementation, the Richard B. Russell National School Lunch Act was amended to include grants which subsidize implementation of FTS programs, the planning

process, and staff training to work with new products that may be unfamiliar.[60] With the current resources available and the evidence suggesting positive health outcomes, implementation of FTS continues to get less complicated and more efficient.

It is important to note that beyond the NSLP, children and families have other government funded resources through which fruits and vegetables can be required. Five government-funded programs administered by the USDA provide fruits and vegetables to children including: The Supplemental Nutrition Assistance Program (SNAP), The Special Supplemental Nutrition Program for Women, Infants and Children (WIC), The WIC Farmers Market Nutrition Program, The Child Nutrition Programs (NSLP and SBP), and the Fresh Fruit and Vegetable Program (FFVP).[61] SNAP provides people of all ages with additional funds to purchase food including local, fresh options. Resources are allocated based off of need and the program has inspired multiple statewide fruit and vegetable campaigns.[61] The WIC program is intended for use by low-income women who are pregnant, post-partum, or breastfeeding, and for infants and children five years old or younger. WIC participants are also provided with nutrition education, which emphasizes nutritious foods and fruit and vegetable consumption.[61] The WIC Farmers Market Nutrition Program (FMNP) enables WIC participants to purchase fresh and local foods, in an unprepared state, from farmers markets.[61] SNAP, WIC, and the WIC Farmers market programs enable families to buy fruits and vegetables to be consumed at home.

Of the five programs through which children can receive fruits and vegetables, the following are commonly implemented in schools and childcare centers. The Child Nutrition Programs including NSLP, SBP, the afterschool snack program, the Summer Food Service Program, and

the Child and Adult Care Food Program. These programs provide nutritious, inexpensive, reduced priced, and free meals to children.[61] The FFVP provides fresh fruits and vegetables, as well as dried fruits, to children at schools, at no cost in all 50 states. All of these programs provide funds and/or free and reduced priced fruits and vegetables to families with children, as well as directly to children. It is important to recognize these programs as other avenues to increase fruit and vegetable consumption among children.

2.8 Economic, Educational, and Health Benefits of FTS Programs

The success of FTS programs has been demonstrated in multiple states throughout the country. According to the National Farm to School Network, 42% of schools are currently utilizing FTS programs. In Figure 2.4 the percentage of states with districts that participate in FTS programs are shown. While most states have FTS programs, not all schools within these states participate in FTS. The percentage of schools that participate in FTS in a particular state are shown in Figure 2.4. The number of FTS programs in the country has continued to rise over the last three decades and researchers believe implementation of FTS programs will help children lead healthier lives in school and at home.[39] Health outcomes and behavior change has been observed as the result of FTS program implementation. Moss et al. 2013 found that students nutritional knowledge, awareness of farmers and local foods, and fruit and vegetable consumption increased when a multidimensional FTS program was implemented.[45] The theory-based explanation for the success of FTS can be attributed to the multi-dimensional approach of most FTS programs that uses a socio-ecological model. FTS programs have been most successful when implemented with educational curriculum and school gardens because these strategies help children to learn from one and other while simultaneously receiving hands-on education to improve their self-efficacy.[62]

The National Farm to School Network has outlined six components of an effective FTS program shown in Figure 2.5.[63]

Figure 2.4 CDC's State Indicator Chart on Fruits and Vegetables in 2018

State	For Individuals and Families			For Children					Food System Support		
	Number of Farmers Markets per 100,000 Residents, 2017	Percentage of Farmers Markets Accepting WIC Farmers Market Nutrition Program Vouchers, 2017	State Policy on Food Service Guidelines, 2014	State ECE Licensing Regulations that Align with National Standards for Serving Fruits and Vegetables, 2016		State Farm to School or Farm to Early Care and Education Policy in Place, 2002–2017	Percentage of School Districts Participating in Farm to School Programs, 2014	Percentage of Middle and High Schools Offering Salad Bars, 2016	State Food Policy Council, 2018**	Number of Local Food Policy Councils, 2018	Number of Food Hubs, 2017
				Fruit	Vegetable						
National	**2.7**	**30.8**	**10**	**9**	**3**	**47**	**41.8**	**44.8 ***	**32**	**234**	**212**
Alabama (AL)	2.9	9.9	No	No	No	Yes	30.8	41.7	No	1	1
Alaska (AK)	5.3	38.5	No	No	No	Yes	76.3	26.1	Yes	0	3
Arizona (AZ)	1.3	38.0	No	Yes	No	Yes	25.3	49.5	No	3	3
Arkansas (AR)	3.6	19.6	No	No	No	Yes	22.3	40.9	No	0	2
California (CA)	1.9	48.5	Yes	Yes	No	Yes	54.9	54.8	Yes	29	14
Colorado (CO)	2.8	5.1	No	No	No	Yes	41.8	N/A	Yes	16	3
Connecticut (CT)	4.3	27.6	No	No	No	Yes	70.3	37.1	Yes	5	2
Delaware (DE)	3.8	16.2	No	Yes	No	Yes	60.0	12.8	Yes	0	0
Dist of Columbia (DC)	7.8	83.3	Yes	No	No	Yes	76.6	46.4	N/A	1	1
Florida (FL)	1.2	8.5	No	No	No	Yes	45.0	16.4	Yes	8	4
Georgia (GA)	1.5	7.6	No	No	No	Yes	61.6	28.6	No	2	7
Hawaii (HI)	6.9	0.0	No	No	No	Yes	47.4	32.3	Yes	0	3
Idaho (ID)	3.7	1.6	No	No	No	No	44.7	56.4	No	1	1
Illinois (IL)	2.6	13.5	No	Yes	No	Yes	24.4	37.6	Yes	2	7
Indiana (IN)	2.9	40.6	No	No	No	No	31.2	44.8	Yes	2	3
Iowa (IA)	7.3	34.9	No	No	No	Yes	29.2	N/A	No	5	5
Kansas (KS)	4	2.6	No	No	No	Yes	32.6	76.6	Yes	11	1
Kentucky (KY)	2.9	39.7	No	No	No	Yes	48.1	25.6	Yes	2	2
Louisiana (LA)	1.7	16.0	No	No	No	Yes	33.3	26.1	No	2	2
Maine (ME)	7.2	40.6	No	No	No	Yes	79.4	82.4	Yes	11	2
Maryland (MD)	2.7	67.9	No	No	No	Yes	68.3	27.8	No	8	8
Massachusetts (MA)	4.7	55.3	Yes	No	No	Yes	68.4	39.7	Yes	6	9
Michigan (MI)	3.4	46.0	No	No	No	Yes	43.2	54.1	Yes	15	10
Minnesota (MN)	3.5	19.8	Yes	No	No	Yes	50.6	73.4	Yes	5	5
Mississippi (MS)	2.8	15.7	Yes	Yes	Yes	Yes	50.0	15.5	Yes	0	4
Missouri (MO)	4.2	0.4	No	Yes	No	Yes	27.4	58.2	No	3	3
Montana (MT)	6.7	18.6	No	No	No	Yes	40.2	76.9	Yes	1	2
Nebraska (NE)	5.1	17.3	No	No	No	Yes	28.9	85.5	Yes	3	1
Nevada (NV)	1.3	7.5	No	No	No	Yes	22.2	23.3	Yes	2	1
New Hampshire (NH)	7.1	9.5	No	No	No	Yes	76.7	48.7	No	0	1
New Jersey (NJ)	1.7	32.0	No	No	No	Yes	48.3	27.1	No	3	0
New Mexico (NM)	3.4	70.0	No	Yes	Yes	Yes	34.5	43.4	Yes	3	1
New York (NY)	3.4	57.2	No	No	No	Yes	60.7	57.9	Yes	4	11
North Carolina (NC)	2.5	15.4	No	Yes	No	Yes	62.2	13.3	Yes	22	12
North Dakota (ND)	8.6	0.0	No	No	No	No	31.3	91.2	No	1	0
Ohio (OH)	2.9	25.7	Yes	No	No	Yes	26.6	31.6	Yes	14	10
Oklahoma (OK)	1.8	11.3	Yes	No	No	Yes	21.3	63.6	Yes	1	2
Oregon (OR)	4.1	57.4	No	No	No	Yes	54.9	74.9	No	4	5
Pennsylvania (PA)	2.4	30.9	No	Yes	Yes	Yes	44.2	39.6	No	5	12
Rhode Island (RI)	3.4	75.0	No	No	No	Yes	90.5	58.8	Yes	0	2
South Carolina (SC)	2.7	21.6	No	No	No	Yes	51.6	24.9	Yes	3	1
South Dakota (SD)	4.7	0.0	No	No	No	No	31.0	85.3	No	0	2
Tennessee (TN)	1.9	3.9	Yes	No	No	Yes	50.9	32.3	Yes	2	4
Texas (TX)	0.8	9.8	No	No	No	Yes	28.0	21.9	No	6	7
Utah (UT)	1.4	2.3	No	No	No	Yes	34.9	46.7	No	1	0
Vermont (VT)	14.9	37.6	Yes	No	No	Yes	82.5	86.2	Yes	1	7
Virginia (VA)	3	1.6	No	No	No	Yes	56.7	24.0	Yes	8	12
Washington (WA)	2.3	65.3	Yes	No	No	Yes	48.5	65.8	Yes	5	8
West Virginia (WV)	5.1	35.5	No	No	No	Yes	82.5	82.1	Yes	0	4
Wisconsin (WI)	5.3	45.8	No	No	No	Yes	48.9	63.9	Yes	7	2
Wyoming (WY)	8.3	0.0	No	No	No	Yes	31.4	77.5	No	0	0

Figure 2.5 Six Components of an Effective FTS Program

Source: National Farm to School Network. *Evaluation for Transformation: A Cross-Sectoral Evaluation Framework for Farm to School*.; 2014.

When children, parents and community members are involved in farm visits, they may reflect and invest more in their food choices as a result of a greater community interest in the economic viability of the farm. This is an example of reciprocal determinism, which involves incorporating education and hands-on learning into a child's environment and takes account of their personal factors that may be reflected in their health behaviors.[52]

The economic advantage of FTS programs is another potential benefit of the programs. Economists have two perspectives on local economic prosperity. Some economists believe that focusing on sales outside of the community pulls money into the community and stimulates economic growth. Others believe that when local goods are bought locally, money stays within the community and creates economic growth.[64] As of 2007, a comprehensive study regarding the effect of purchasing local foods had not been completed. Researchers from Pennsylvania State

University filled this gap and completed a study utilizing the Census of Agriculture and the National Agriculture Statistics Service yearly reports. Researchers found that nationally, economic growth was not seen with community-focused agriculture (CFA), but when individual counties were analyzed, statistically significant growth was seen in parts of the country. For example, in New England, 21.6% of farmers report producer-to-consumer transactions, compared to only 6.2% of farms, nationally.[64] The data from this study suggest that in certain U.S. regions, such as New England and the Mideast, local CFA generated statistically significant economic stimuli between 2002 and 2007.[64]

While the demand for local and regional foods has continued to grow, in some areas of the country the supply and demand are not compatible.[65] Some U.S. regions have a higher demand for local foods than are available in the area. Depending on the area, local and regional foods are bought and sold in different ways. Different selling avenues have different implications for farmers and producers. Direct retail channels and food hubs, as opposed to mainstream channels such as grocery stores, allow the farmer or producer to secure a larger portion of the profits, even when considering additional costs.[65] Furthermore, researchers have found that when the farmers or producers utilize direct markets, they are able to make their own price based on local demand for the product, which results in higher profits for farmers. Community supported agriculture (CSA) is another approach that has been shown to be highly profitable for small-scale farmers in order to reduce labor input by avoiding a middleman or staffing a market.[65]

Beyond the economic stimulus, local or regional foods may be more nutrient dense than produce that has been transported longer distances. The way that produce is harvested, how it is stored

post-harvest, and the length of time it is stored prior to consumption, are all factors that influence nutrient retention. Large-scale industrial farms are more likely to use machines to harvest their produce, or harvest less gently than a small scale, local farms and farmers. The stress placed on produce may reduce the nutrients that are retained.[66] Furthermore, oxidation of nutrients begins the moment a piece of produce is harvested, with the average length of travel being five days, the average length of stay in a store being two days, and the average length of storage being three days, most produce will not be eaten until ten days after being harvested.[66] With heat, light, oxygen, potential hydrogen (pH), and even bruising all contribute to nutrient retention, the rapidly changing environment of produce in transit is likely to affect the nutrient density.[67,68] Moreover, peak maturity is the point at which produce has developed optimum nutrient value, due to the long transit times though, many farmers pick produce well before maturity in order to reduce mechanical damage during transportation and also to allow for post-harvest ripening due to long durations before consumption.[66,67] Consequently, this significantly reduces the level of nutrients the produce develops. Considering the factors that affect nutrient retention, local goods should be purchased whenever possible.

The undesirable circumstances that factory-farmed produce is commonly exposed to have greatly reduced the quality of fruits and vegetables Americans eat.[36] Purchasing local produce can help increase the quality and nutrient value, while enhancing the flavor profile and stimulating local economies. For these reasons, larger scale operations, such as schools, need to begin utilizing local food procurement.

Despite the wide availability of fresh produce year-round in the U.S., and the availability in other forms including frozen, canned, and dried, Americans still do not consume the recommended servings per day of 4.5-cup equivalents per day. Contrary to the year-round availability of produce, the farm to table and FTF movements have become popular to encourage people to purchase and consume local, high-quality, and traceable foods to increase their diet quality, support local businesses, and engage in food ethics to strengthen the community food system. Food ethics is an increasingly important concept which involves practicing ethical production, distribution, preparation and consumption of food.[69]

An important adaptation of FTF is the FTS movement that promotes the utilization of local or regional food producers and purchasing local/seasonal goods whenever possible. FTS programs have increased in popularity since the 1990s to connect local food producers with schools. This relationship is beneficial for farmers and local food producers, community members, schools and children to integrate FTS programs, agricultural and nutrition curricula, farm tours, taste tests, and community involvement. Research has shown that these multi-dimensional programs are making beneficial impacts on the economy, the health behaviors of children, and the communities as a whole.[45] Moreover, current research supports the fact that fresh, local and regional produce is likely to retain more vitamins and minerals as a result of a shorter duration between the time of harvest and consumption, particularly B vitamins.[70] State legislation has also been effective to promote and support the implementation of FTS programs. For example, Vermont introduced a bill to include early childhood programs, which has enabled the expansion of their FTS program.[71] Furthermore, Alabama passed legislation that increased their small purchase threshold for schools by 50% (from $100,000 to $150,000) to make it easier for schools

to purchase products from local food producers.[71] State legislation can enable schools to fund, implement, institutionalize, and sustain FTS programs over the long term. Beyond specific FTS legislation, tax incentives can help stimulate the local food movement. In Virginia, farmers are granted a tax credit when they provide food banks with their excess produce.[72] Incentives similar to this could also encourage farmers to donate excess produce to schools to make local foods economically viable to school systems.

Introducing a seasonal and regional food system and educational curriculum in schools through FTS programs can enable schools to participate in creating a sustainable community food system. While specific health outcomes for FTS programs are not yet available, research has shown that children's fruit and vegetable consumption has increased as a result of FTS programs.[45]

Beyond the multi-dimensional implementation strategies and benefits seen in effective FTS programs, other steps must be taken to build and maintain sustainability for the program. The National Farm to School Network recommends flexibility, nutrition staff involvement, and planning around the seasons in order to plan and implement a sustainable FTS program. Furthermore, incorporating local foods in multiple ways has been shown to increase the sustainability of programs. For example, adding a la cart fruit and vegetable items, incorporating fresh produce into baked goods, and also making a plan for how to use produce before purchasing.[73]

By sharing effective FTS program strategies, programs can help to inform the design of future programs by providing evidence of successful, theory-based models.[52] Utilizing recommended practices can also make FTS programs sustainable over the long-term. Since every community,

school, and child is different, no model will perfectly outline program implementation. However, models can help to convey the importance of the multi-level approach for FTS programs that has been successful throughout the U.S. Incorporating education, hands on learning, farm trips, taste tests, and more, children are most likely to benefit from and make positive changes to their health behaviors.

2.9 Policies to Promote FTS and FTF Programs

The lack of availability and access to fruits and vegetables is a substantial barrier to consumption by children and adolescents. At a time when so many fruits and vegetables are available year round in many areas of the U.S., access and affordability can deter people from purchasing and consuming fruits and vegetables every day. Providing fresh fruits and vegetables at school is an effective avenue for increasing consumption in children. FTS programs help make fruits and vegetables more appetizing and help increase consumption, but not all states explicitly support FTS programs, which are more viable in states where legislation and laws have been passed which provide funding for FTS program implementation.[41] Furthermore, implementing FTS programs increases fruit and vegetable availability, which results in an overall increase in consumption among children.[45] With FTS programs, produce is more likely to be available in schools, which allows children access to fresh and local or regional fruits and vegetables and states are realizing the importance of FTS legislation. The National Farm to School Network conducted a legislative survey between 2002 and 2017 that found a significant increase in FTS programs with 46 states introducing legislation in the past 15 years.[71] They also found that of the 46 states, including Virginia, that had implemented FTS legislation by 2017, the most common type of legislation was to earmark funding sources to support FTS implementation.[71]

The 2010 Healthy, Hunger-Free Kids Act provided financial assistance to schools to implement FTS programs. From 2013-2015, over $15 million dollars were available to schools and over 220 new FTS projects were started or implemented in the same three-year time period.[74] During the 2011-2012 school year, $386 million of food was sold directly form a local producer to a school.[74] FTS implementation is more viable with FTS legislation and states are continuing to work towards both.

2.10 FTS Programs in Virginia

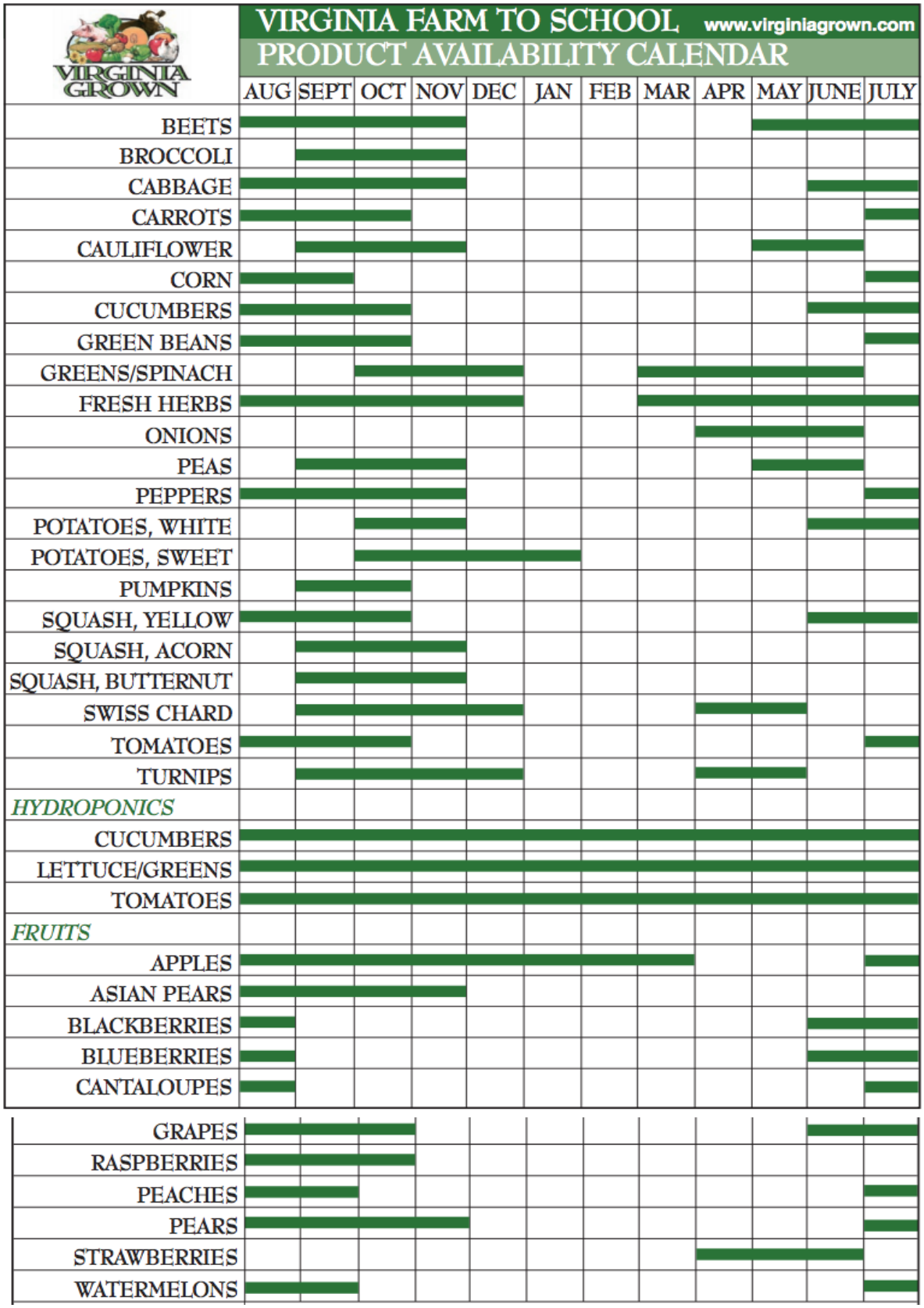
In Virginia, three pieces of legislation have been implemented since 2007 in order to encourage FTS programs. This legislation: (1) established a Virginia-specific FTS website (2007); (2) created a FTS task force to research the best methods of implementing FTS programs throughout Virginia (2007); and (3) established Virginia's FTS week in November (2010).[71] The state continues to work toward improving legislation to support FTS programs.

An estimated 68 school districts in Virginia currently participate in a FTS program or related activities, and more than two thirds of all counties in Virginia participate in FTS programs for preschool programs.[75] Although, Virginia does not have regulations on Early Care and Education licensing that align with the national fruit-serving standards.[23] Of the 68 counties with FTS programs, large clusters exist in the Northern Virginia region (NOVA) as well as the southeastern coast of Virginia and central Virginia. The 2015 FTS national census documented that, over $7 million dollars have been invested in local and regional foods, primarily fruits and vegetables, but also milk products and meats.[75] To further promote engagement in FTS programs

and activities, Virginia has supported the annual national FTS month celebration every October since 2008. Furthermore, to make implementing seasonal foods into school meals and snacks user-friendly, VDACS has created a Virginia FTS Product Availability Calendar, which shows the availability of over 30 different fruits and vegetables throughout the year.[76] This calendar is shown below in Figure 2.6. Additionally, VDACS has created a Virginia Farm to School Network, which helps connect local food producers and school systems.[77] Despite many resources, of the 57% of schools utilizing FTS programs in Virginia, there have been no formal FTS programs reported in Montgomery County.[75]

Figure 2.7 shows an obvious lack of formal FTS programming in the southwestern agricultural region of Virginia, located within Appalachia. Counties labeled with stars have reported participating in FTS programs or activities to the National Farm to School Network. This rural region is not fully utilizing its local or regional goods within the community food system. The USDA, at a state and national level, continues to increase the use of local and regional foods. Montgomery County, Virginia has opportunities to implement and institutionalize FTS programs given the abundance of local resources. It is important to note, however, that the National FTS Network Survey does not capture informal FTS programs and activities.

Figure 2.6 Virginia Farm to School Product Availability Calendar



Source: Virginia Department of Agriculture and Consumer Services. Virginia farm to school product availability calendar. Farm to School Tools and Resources.

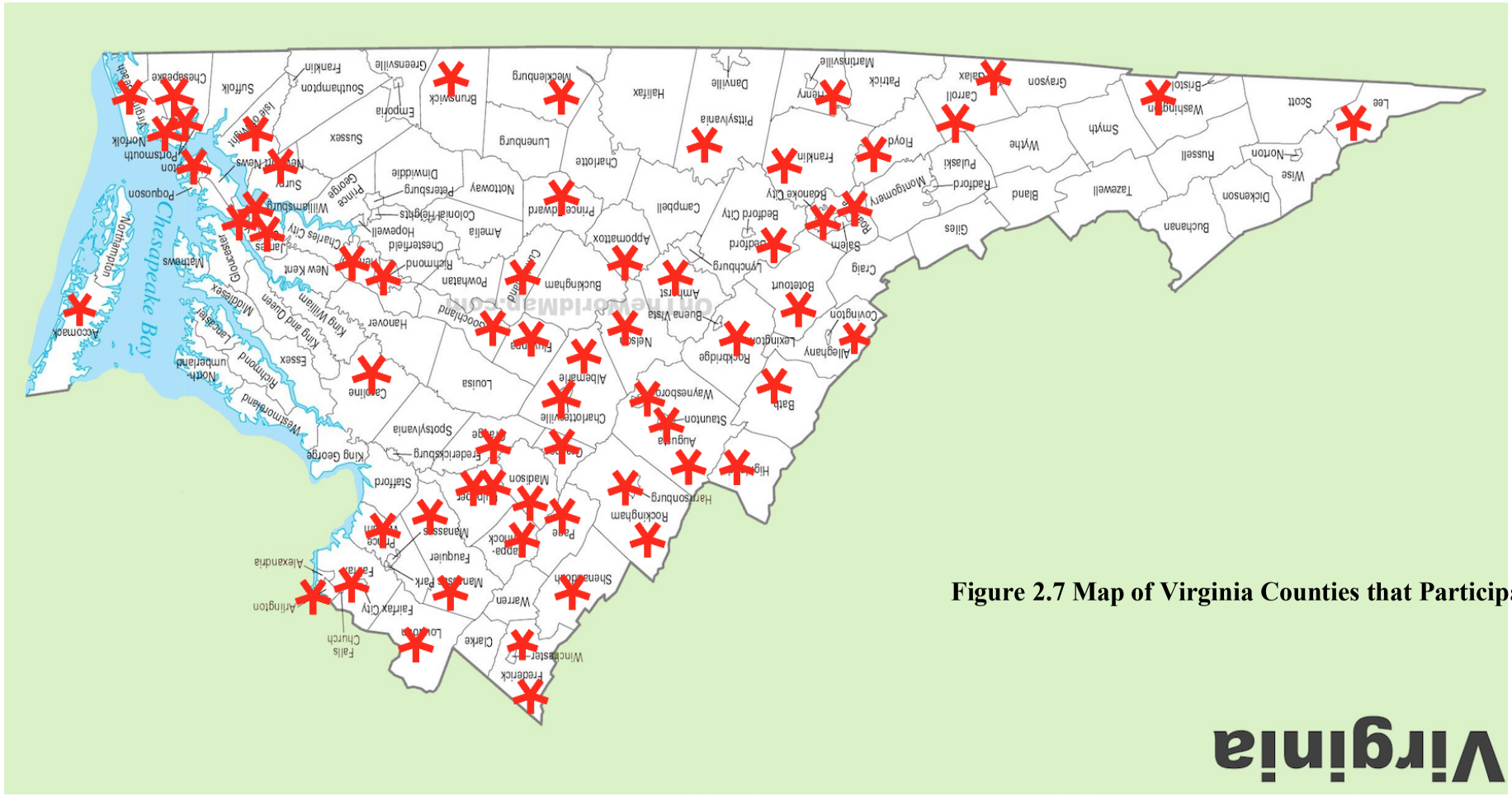


Figure 2.7 Map of Virginia Counties that Participate in Farm

2.11 Conclusions and Knowledge Gaps

Fruit and vegetable consumption are cornerstones of a healthy diet. American children and adults are not consuming the recommended servings of fruits and vegetables, despite the numerous opportunities to acquire fresh fruits and vegetables, as well as the year-round availability. Currently, the FTF movement in the U.S. emphasizes local procurement of fresh produce. Applying this to school meals, FTS programs emerged. While the literature is still sparse, researchers have identified FTS programs a successful strategy to increase fruit and vegetable consumption among children while also incorporating a multi-disciplinary educational curriculum.

Research is limited on stakeholders' views about FTS programs, in general and in Montgomery County, Virginia. Furthermore, available data suggests that stakeholders have no intention of implementing FTS programs in the near future despite the abundance of local and regional foods

and implementation resources. My first research objective is to identify diverse stakeholders who may influence the implementation of FTS programs in Montgomery County, Virginia. My second research objective is to assess diverse stakeholders' views regarding the benefits, opportunities, and challenges of primary schools to develop, implement, monitor, and evaluate a FTS program in six primary schools in Montgomery County. My third research objective is to describe policies and future actions that stakeholders can take to institutionalize and sustain FTS programs in Montgomery County and southwestern, Virginia. Together, this research will provide information for stakeholders to design, implement and sustain FTS programs in the future.

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Chapter 3 Methodology

This MS research has three research objectives (RO) to help develop, institutionalize, and sustain a FTS program in six primary schools in Montgomery County, Virginia. RO1 identified and mapped key stakeholders who have a vested interest in FTS programs in the Commonwealth of Virginia. The second objective (RO2) examined the views of diverse stakeholders regarding their perceptions of the benefits, opportunities, and challenges of implementing a FTS program in Montgomery County, Virginia using Q methodology study, followed by a post card-sort questionnaire to gain a deeper understanding of stakeholders' views about FTS program opportunities, challenges, and benefits in Montgomery County, Virginia. The purpose of RO3 was to analyze the results from RO1 and RO2 to identify policies and future actions needed to institutionalize and sustain FTS programs throughout Montgomery County and in southwestern Virginia. The IRB research protocol was submitted to the Western Institutional Review Board in October 2018 to obtain approval to conduct this research and obtain an approval letter prior to

data collection (Appendix A). The WIRB issued a Letter of Exemption Determination on October 24, 2018 to allow the commencement of data collection. This study was determined to fall under exemption criteria under 45 CFR §46.101(b)(2) due to the low risk to participants. On February 1, 2019, the study protocol was amended and approved to include pilot testing on Virginia Tech faculty and students.

3.1 Dissemination Strategy

A dissemination strategy is an intentional plan to distribute science-based information and research from a particular project through specified channels and strategies.[1] This section describes the dissemination strategy for the FTS study outlined. Once the finalized deliverables were created (i.e., visual digital stakeholder map, FPG inventory, RO2 data and RO3 data) and the research coordinator has described the outcomes in this MS thesis, the data will be shared with key stakeholders who were included in the study and interested in the results, or other stakeholder throughout the region of southwestern Virginia. Staff of the schools in Montgomery County, Virginia will also be provided with the final deliverables if interested. Future dissemination plans include journal articles and an online database sharing key FTS stakeholders in Virginia identified through a stakeholder map.

3.2 Researcher Reflexivity Statement

According to the Robert Wood Johnson Foundation, reflexivity involves stating the researcher's knowledge development and background for a research project.[2] Therefore, it is important to define the researcher's prospective and position in all steps of the process. This is an intentional statement of my research reflectivity.

I am currently a 23-year old female graduate student in the department of Human Nutrition, Foods, and Exercise in the College of Agriculture and Life Sciences at Virginia Tech. My research concentration is in Community and Behavioral Sciences. I also completed my undergraduate work at Virginia Tech in the same department where my love for food and nutrition grew. Throughout my undergraduate career I took part in various opportunities, which allowed me to work with children and work in community and clinical nutrition settings. Through these opportunities I gained a fascination with the importance of proper nutrition during childhood and the connection between health initiatives and health outcomes.

During the summer of 2017, I gained experience as an intern for the Virginia Family Nutrition Program through which I managed a community garden and provided nutrition education for SNAP participants with an emphasis on local foods. After this internship, I was offered the position of Director's Assistant at the Blacksburg Farmers market where my passion for local foods grew. During the summer of 2018, I was promoted to Market Manager of the Blacksburg Farmers Market. In this new position I became responsible for the reporting of our SNAP-doubling program, which is a grant-funded program that doubles SNAP money to be used at the farmers market. Through my work at the farmers market I have gained an appreciation for local foods and believe in the multi-faceted benefits gained through local food consumption. With my experience and knowledge of local foods, I believe there are many benefits towards increased utilization of local foods.

In addition to the areas of research that interest me, I have an affinity for interdisciplinary approaches. To connect some of my nutrition-related passions, I began researching FTS

programs, which are lacking in Montgomery County, Virginia. I am attracted to the interdisciplinary nature of FTS programs, which seeks to improve diet quality and health outcomes of children by combing education and hands-on experiences. Research further supports that implementing nutrition and agricultural curriculum along with local foods is most beneficial for children's health. I truly believe that FTS programs, when implemented correctly, have the ability to increase the quality of children's diets.

RO1 Methods

3.3 Stakeholder Mapping

A stakeholder is defined as a person or organization with a particular interest in, or someone who is affected by, an initiative or action.[3] It is essential to understand the underlying reasons for Montgomery County, Virginia not having FTS program stakeholder engagement. The Institution of Development Studies supports that effective communication requires stakeholder engagement to affect the intended audience.[3] To complete a map of key stakeholders in Montgomery County, Virginia, relevant actors were identified. Network mapping is a technique used to identify and reflect on the relationships and influence among stakeholders. A map was created using an adapted version of the template created by Conner et al. 2011.[4] To identify relevant stakeholders, online, public resources were used including government agency websites and school websites. Actors involved with FTS policy, implementation and sustainment were included in the stakeholder map. This network-mapping tool will provide educators and researchers with a

mental image of the breadth and depth of the local, state, and federal FTS network and also identifies leverage points for policymakers and advocates.[4]

RO2 Methods

3.4 Adapted Socio-ecological Model

Figure 3.1 shows an adapted version of the socio-ecological model that guided the second research objective.[5] This conceptual framework divides FTS programs into four outcomes and levels, from the individual to the national level. Public health, community economic development, education, and environmental quality outcomes are part of the adapted model, which encompass the multidisciplinary impact of FTS programs. Furthermore, the levels of community, which mirror the traditional socio-ecological model, encompass the levels of stakeholders within FTS programming who are included within this MS proposal. The areas of impact outlined in Figure 3.1 will guide the statements included in the Q methodology study described in the next section.

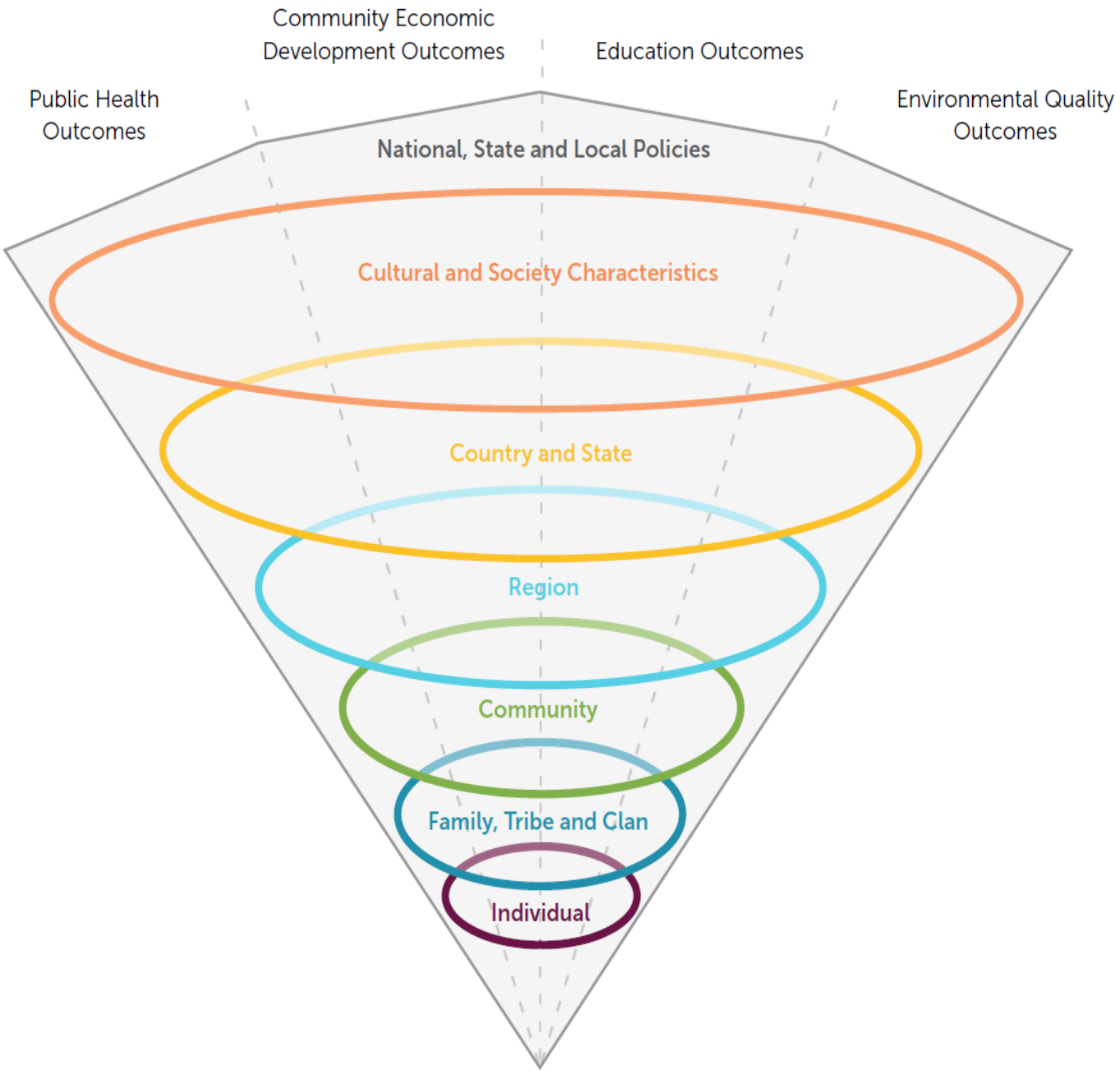
3.5 Q Methodology Study

Q methodology is an exploratory research approach that represents different points of view of human subjectivity and subconscious thoughts and beliefs. Utilizing a mixed-methods approach, Q methodology collects quantitative and qualitative data to examine beliefs. Developed by William Stephenson to measure subjectivity, Q methodology is now widely used among different disciplines.[6] Q methodology uses sorting techniques, a Q sort, and factor analysis to measure and analyze the data.[6] Q methodology generally has participants organize statements into categories, and then organize these same statements along a normal distribution based on

how much they agree or disagree. There are eight steps in a Q methodology study including: (1) formulating a research question; (2) generating a concourse; (3) identifying a theoretical conceptual framework to select the Q sample; (4) select and describe the p set; (5) collect the evidence; (6) analyze the evidence; (7) interpret the evidence; and (8) write up the results.[7] The rational surrounding Q methodology is as follows; opinions are ideas that are believed and easily expressed verbally. Opinions represent a person's attitudes and beliefs on a certain topic, which are more difficult to articulate. By understanding a person's beliefs, a person's values system is reflected. Q methodology is able to capture a person's values system and individual subjectivity by having participants organize statements into a normal distribution based on how much they agree or disagree.[8] R methodology, in comparison, does not capture a person's values, but rather their opinions on a topic in isolation. R methodology is a more commonly used form of methodology that utilizes normal factor analysis to find correlations between variables, or inter-individual differences. R methodology does not create interaction between variables (traits) whereas the variables in Q methodology (participants) are compared and intrapersonal differences in q-sets are compared.[8] In other words, Q methodology looks at intra-individual differences, or differences within a single participant's response which defines their viewpoint. Q methodology is able to identify unique viewpoints of individuals holistically as opposed to the prevalence of views as captured in surveys. By analyzing and comparing a compilation of statements, all related to one topic, participants prioritize statements based on how closely they align with their values. In this FTS study, Q methodology is beneficial to understand the views of stakeholders regarding FTS programs. Stakeholders include school employees, parents and caretakers, farmers, and state government agency staff and state legislators. To date, there is not research on FTS program stakeholders, which utilizes Q methodology as a way to assess values

and biases. By utilizing Q methodology, this study reveals common thought processes and values systems, which serve as barriers to further FTS implementation in Virginia. Furthermore, this study reveals common values systems among stakeholder groups, which can be used to inform implementation strategies in order to create buy-in for new FTS programs. Q methodology is an effective approach to explore unique viewpoints of stakeholders that reflect their opinions, beliefs, and values about FTS programs.[9]

Figure 3.1 Adapted Socio-Ecological Model for Farm to School Programs



Source: National Farm to School Network. *Evaluation for Transformation: A Cross-Sectoral Evaluation Framework for Farm to School*; 2014.

3.6 Participants and Study Design

Approximately three people from each of five stakeholder categories (n=14 adults), as defined in RO1, were recruited to participate in the Q methodology study and complete a post Q-sort questionnaire. The five stakeholder categories included Parents and caretakers, teachers and principals, farmers, government agency employees, and school nutrition employees. Study recruitment fliers and email study recruitment fliers (Appendix B and Appendix C) were posted in community buildings and a farmers market, and were also sent via email to specific principals, farmers, legislators and teachers. The master list of study activities can be found in Appendix D. Prior to beginning the card sort, participants read and signed a consent form (Appendix E) and completed a demographic survey (Appendix F). Q sort instructions were then read to the participants (Appendix G). The Q methodology card sort consisted of 48 statements (Appendix H and Table 3.2) that were sorted by the participant and placed on a Q study card-sort grid (Appendix I). The 48 statements were chosen based on the four outcome categories with four statements for each category (Appendix K). The 48 statements were chosen from a concourse of 75 statements obtained from website articles, blog posts, journal articles, magazines, and reports and organized according to an adapted socio-ecological model (Figure 3.1). This subset of 48 statements is known as the Q sample. From the 75 statements, which made up the concourse, statements were selected as they fit into the four thematic categories. The four thematic categories included public health, community economic development, education, and environmental quality. When selecting the Q sample, 12 statements were selected as they related to each of the four thematic categories. Of the 12 statements related to each of the four thematic categories, four statements were positive, negative, and neutral, to total 48 statements that were sorted by participants. The positive statements supported FTS programs, as they related to the thematic category. The neutral statements did not support or deny the benefits of FTS programs.

The negative statements did not support the benefits of FTS programs. The arrangement of statements is shown in Table 3.1. The 48 statements are shown in Table 3.2.

The research coordinator completed a score sheet to record the randomly assigned numbers for each statement after the participants completed the Q sort. A questionnaire followed the Q sort to further explore stakeholders' perspectives of FTS programs in southwestern Virginia (Appendix L). This study was designed to take place in-person or online, and lasted an average of 40 minutes to complete all study activities. Data collection took place from November 27, 2018 through March 1, 2019.

3.7 Pilot Testing

Prior to official participation the study was pilot tested. The Q sort activity and post-Q sort six-item questionnaire are the instruments that were pilot tested with individuals who volunteered to participate (n=3). Pilot testing allowed the opportunity to clarify directions, FTS statements, and post-Q sort questions. The pilot tested study participants were not required to be part of an identified stakeholder category. The data from the pilot testing is not included in the final data analysis.

3.8 Activity 1: Consent Form

All participants began by reading and signing an adult consent form as seen in Appendix E.

3.9 Activity 2: Stakeholder Demographic Survey

All stakeholders completed a four-item demographic survey with questions related to their age, race, ethnicity, gender, highest level of education, and current occupation. Participants were informed that they could skip any questions they were uncomfortable answering. Participants were assigned an identification number to remain anonymous to keep their data confidential.

3.10 Activity 3: Q Methodology Study Card-Sort Activity for FTS Programs

Participants then completed a Q sort. Forty-eight statements, related local foods, FTS programs were printed on small pieces of paper with Velcro on the back. The statements range from negative (not supporting local foods and FTS programs and implementation) to positive (supporting local foods and FTS programs and implementation). Forty-eight statements were included so that four statements reflected positive, negative, and neutral views in the four areas shown in Figure 3.1 for community development, education outcomes, environmental quality, and public health. A grid was laid out in front of the stakeholder representing a normal distribution with a number line ranging from -4 to +4 (most disagree to most agree). The stakeholders were asked to place the statements along the number line, in the grid, to reflect their opinions about what they "most agree" and "most disagree" with related to FTS programs, placing the statements they disagree with most at -4 and agree the most with at +4. Each statement was assigned a random number and these numbers were used to record the stakeholders' responses.

3.11 Activity 4: Post Card-Sort Questionnaire

The post-card-sort questionnaire was delivered verbally by the research coordinator in the form of a brief interview. The questionnaire asked participants about their experience sorting the statements. The questionnaire probed for statements that were difficult to sort, statements that were easy to sort and statements that were unimportant or ambiguous to the participant. The questionnaire also asked the participants' views about FTS programs in southwestern Virginia This activity took on average 10 minutes. The post card-sort questions were as follows:

1. What did you think as you sorted the farm to school statements?
2. Explained why you sorted the farm to school statements in the 'most agree' +4 pile.
3. Explained why you sorted the farm to statements in the 'most disagree' -4 pile.
4. Explained why you sorted the farm to school statements under the 0 column.
5. Describe which statements you have the strongest support for and why.
6. What future actions do you think need to be made to institutionalize and sustain a farm to school program in Montgomery County, Virginia.

RO3 Methods

3.12 Interview Analysis

The results from the activities guided by RO1 and RO2 were used to develop policy suggestions and suggest actions that can be taken by diverse stakeholders to institutionalize and sustain a FTS program in Montgomery County, Virginia. The results from RO1 and RO2 were analyzed to identify gaps in knowledge and research. With these gaps in mind, appropriate policies were also identified and suggestions were made.

3.13 Data Analysis

Stakeholder Mapping Analysis

The stakeholder map has been visually analyzed to better understand the relationships between FTS stakeholders in Virginia. The relationships between actors and the hierarchy of power were analyzed to comprehend the dynamic between stakeholders.

Q Methodology Study Analysis

The data from the Q-sort activity was analyzed using KenQ Data analysis software that was done online on the Co-Investigator's computer.[9] The KenQ software was developed by Shawn Banasick and is free to use for the public.[9] The 48 statements with associated numbers (Q sample) and 14 Q sorts (P set) were entered into a formatted excel sheet that was downloaded from the KenQ website and then uploaded once filled in with p-sets and statements. The KenQ software developed a correlation matrix (Appendix L) and then unique factors were extracted from the correlation matrix (Appendix M). The researcher evaluated the different factor extraction combinations (2, 3 and 4). The data were analyzed using centroid factor analysis of the sorting patterns to identify unique factor arrays, which reflect views that diverse stakeholders have regarding FTS programs.[7] The centroid factor analysis method was used instead of a principal component extraction method because it left all possible solutions or factors open so that the strength of the factors determined which factors were further analyzed in the study.[7] Varimax factor rotation provided a measure that exemplifies how much each Q sort identifies with that factor, known as factor loading. Q sorts with an absolute value of 0.38 or higher were considered to significantly load onto a factor. The number of factors that were extracted was

dependent on eigenvalues, which signify the statistical strength of a factor in comparison to the total variance within a correlation matrix.[7] Generally, factors with an eigenvalue that is less than 1.00 are not kept as they account for less variance than a single Q sort. However, qualititative analysis allows Q methodology researchers to determine the overall significance of a factor when collectively analyzing the eigenvalues, percent explained variance and emergent themes.[9] The data was then qualitatively interpreted using the factor arrays, which is, "a single Q sort configured to represent the viewpoint of a particular factor" to identify emergent themes (Appendix N).[7] The emergent themes of the factors were compared qualitatively and using Z-scores. Due to the fact that factors have varying amounts of loading q sorts, the values assigned to the sorts cannot be compared. Z-scores are assigned to statements to allow cross-factor comparison. The Z-scores are calculated based on the amount of standard deviations a statement is from the mean value of that statement.[7] These Z-scores allows the comparison of the ranking of each statement in contrast to all other statements.

Post Q Methodology Study Questionnaire

The six-item questionnaire administered after the card-sort activity was analyzed to find trends in participants' responses, specifically trends among specific stakeholder categories. The common themes from responses to the six-item questionnaire were summarized in tables below.

Table 3.1 Generating the Q sample for the FTS Program Study

Q Sample (n=48 statements)	**Four Thematic Areas Related to Farm-to-School (FTS) Programs** *Grounded in a socio-ecological conceptual model*			
	Public health	**Community development**	**Education**	**Environmental quality**
Statements supporting a positive view (n=16 statements)	4	4	4	4
Statements supporting a neutral or ambivalent view (n=16 statements)	4	4	4	4
Statements supporting a negative view (n=16 statements	4	4	4	4

influence on improving students' nutrition knowledge.	
11. Farm to school topics are already covered in elementary schools in southwestern Virginia.	35. Farm to school is talked about as a success, but small local farmers are still struggling to make long lasting business contracts with schools.
12. Farm to school programs can encourage children to learn about environmentally conscious attitudes and behaviors.	36. Farm to school programs don't just feed students, it educates them.
13. Farm to school program success is not dependent on a curriculum.	37. Food producers will continue using chemicals despite the demands of farm to school programs in order to produce the biggest yield.
14. Hands-on activities can be included at farmers' markets and community centers to engage children and families to promote the benefits local foods outside of school.	38. Montgomery County Schools do not have adequate resources needed to properly create a farm to school curriculum.
15. Schools that want to participate in farm to school programs, still end up buying from big, national companies who pose as 'local' and 'organic' food producers.	39. Farm to school programs can diversify the food producer market and create local jobs in communities.
16. Not enough schools participate in farm to school programs to see an environmental impact to reduce greenhouse gas emissions related to agriculture in southwestern Virginia.	40. Students don't want more education on topics they don't care about.
17. Farm to school programs address food system inequities by expanding all students' access to high quality, local fruits and vegetables.	41. Children's diets improve when they learn where their food comes from and how it is produced.
18. Farm to school programs do not enrich a child's education.	42. Community engagement is an unrealistic outcome of a farm to school program.

19. Farm to school programs are environmentally sustainable and better for the environment than a traditional school foodservice program.	43. Federal funding for farm to school programs should be cut from the 2010 Healthy, Hunger Free Kids Act.
20. Farm to school programs do not positively impact students' health.	44. Farm to school programs have limited impact on protecting the environment.
21. There are few financial incentives for farmers to participate in farm to school programs in southwestern Virginia.	45. Farm to school programs do not benefit communities.
22. Farmers are not adequately compensated for their produce or meat when they sell to school foodservice customers.	46. Students eat healthier when their school participates in farm to school programs.
23. There are enough local foods.	47. Farm to school programs can create a link between schools and communities.
24. Farm to school programs have the potential to increase the proportion of available local foods at grocery stores.	48. Farm to school programs can teach children and adults how we used to eat in the past.

Chapter 3 References

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Chapter 4 Results

The results for this exploratory study are described in order of study objective throughout this chapter. Objective 1 identified and mapped key stakeholders who have a vested interest in FTS programs in the Commonwealth of Virginia. Objective 2 examined the views of diverse stakeholders regarding their perceptions of the benefits, opportunities, and challenges of implementing a FTS program in Montgomery County, Virginia. Objective 3 analyzed the results from RO1 and RO2 to identify policies and future actions needed to institutionalize and sustain FTS programs throughout Montgomery County and in the southwestern region of Virginia.

4.1 FTS Stakeholder Map

The first objective of this MS thesis was to identify and map FTS stakeholders in southwestern Virginia. The local level stakeholders were first identified, which included parents, children, community members, and local farmers. Montgomery County Public School principals, teachers, and food service staff are also important stakeholders. Since this MS thesis was most interested in elementary schools, only Montgomery County elementary schools (n=11) were included in the stakeholder map created for RO1. Continuing up the hierarchical ladder, the superintendent and the director of school nutrition for Montgomery County were identified as key players to recruit to develop a FTS program. Above the county-level stakeholders, the Virginia state USDA, Virginia Department of Education, and Virginia Department of Agriculture and Consumer Services were all identified as state-level departments with a vested interest in and potential influence to support FTS programs in Virginia. Relevant directors within these departments were identified. Lastly, at the national level, the CDC, USDA, HHS, FDA, and DoE are all federal agencies with departments that provide resources, technical assistance, support and research related to FTS programs.

A FTS stakeholder map was drafted and translated to a digital version using online resources, and department organizational charts. More specifically, government agency websites and school

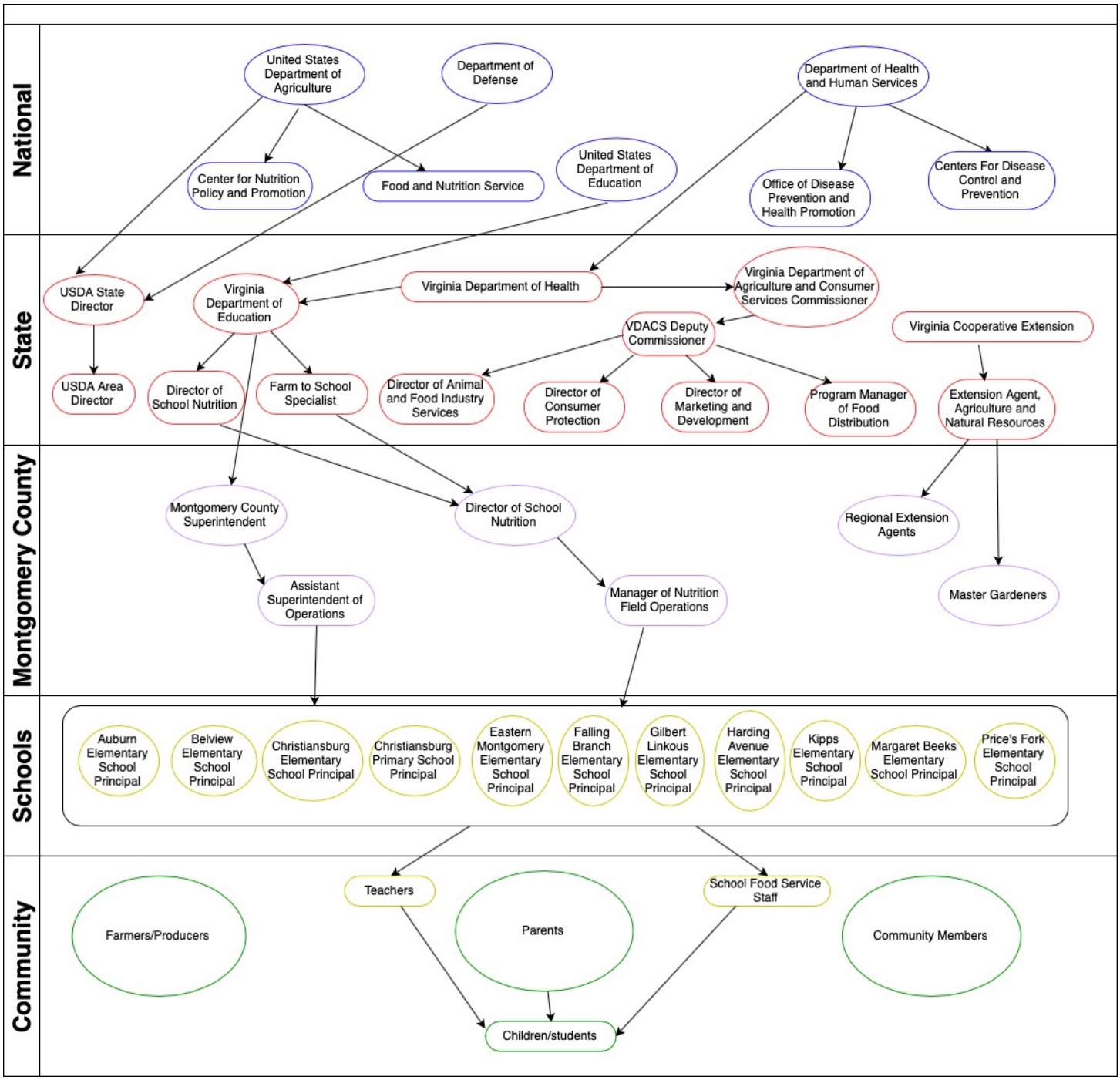

Figure 4.1 Farm to School Stakeholder Map for Southwestern Virginia

4.2 Participant's Demographic Profile

A majority of the participants for this study were white with only three participants of another race. The participants represented all age categories up to 64 years of age. Both men (42%) and women (58%) were represented in the participant pool. All stakeholder categories identified were represented in this study. The overall education level of participants ranged from some college to a master's degree, but the majority of participants held a bachelor's degree. The demographic information of the participants is further summarized in Table 4.1.

Table 4.1 Participants' Demographic Profile

Characteristics	Participants (n=14) (%)
Sex	
Male	6 (42%)
Female	8 (58%)
Age (years)	
18-24	2 (14%)
25-34	4 (28%)
35-44	5 (35%)
45-54	1 (7%)
55-64	2 (14%)
Highest Level of Education	
Some college, no degree earned	2 (14%)
Bachelor's degree	7 (50%)
Master's degree	5 (35%)
Race	
White/Caucasian	11 (78%)
Black/African Americans	1 (7%)
Hispanic	1 (7%)
Other	1 (7%)
Stakeholder Group	
Teacher/principal	3 (21%)
Farmer	3 (21%)
Government agency employee	3 (21%)
Parent	4 (28%)
School nutrition employee	1 (7%)

4.3 Q-Sort

4.3.1 Selection of Viewpoints

When analyzing the data, two, three and four factor arrays were assessed to decide the factor solution which best summarized the data. To calculate whether a Q-set significantly loads on to a factor, the following equation was used:

2.58 * (1/(# of statements))= X * 0.144= Significance level

For this study, 48 statements were used, X=2.58 creating a significance level of 0.38. Any Q sort with an absolute value of 0.38 was considered to significantly load onto a factor solution. A two and three factor solution met these statistical requirements and encompassed all 14 p-sets. Factors are created based on grouping Q sets that are statistically similar. After analyzing the eigenvalues, a two-factor solution was chosen. The eigenvalue helps determine the significance of a factor. Generally, factors with eigenvalues at or above 1.00 are accepted.[1] The number one shows that a single factor accounts for the variance of at least one Q-sort. Factor one had an eigenvalue of 7.71. Factor two had an eigenvalue of 0.71 and factor three had an eigenvalue of 0.28. Due to the proximity of 0.71 to 1.00, factor two was kept for further analysis, however, the eigenvalue for factor three was significantly below the benchmark value, 1.00. The low eigenvalue of factor three contributed to the decisions to use a two-factor solution for this Q methodology study. Another component to consider when deciding how many factors to include in the final analysis is the percent of explained variance, after rotation. Utilizing a two-factor

solution accounted for 60% of the explained variance. A three-factor solution accounted for 62% of explained variance. Because factor three accounted for slightly more variance, the decision was made to qualitatively analyze factor three responses. After looking at the statements ranked highest and lowest in factor three versus factor one and two, there was no clear theme, which emerged from this factor. Due to the low eigenvalue, minimally increased percent-explained variance, and lack of an emergent theme, I did not include a third factor in this analysis. The final two-factor analysis accounted for 60% of the study's variability. With Q methodology, studies should aim to have factors account for 30-40% of the variability, at a minimum.[1]

4.3.2 Viewpoint 1: Appreciators of Child-Centered Benefits

A total of 12 out of 14 participants loaded on to factor one, which accounted for 44 percent of the study's variance. The participants who loaded on to this factor included the majority of participants and were closely balanced as far as sex and stakeholder category. All age groups were represented with the exception of 45-54 years and all races were represented with the exception of African American. The race distribution was not evenly balanced for this study. The participants for this study were majority Caucasian. Based on z-scores for factor one this group of participants ranked statements related to the benefits of FTS programs for children as the statements they agreed with most.

This viewpoint identified FTS programs as beneficial in helping children foster a healthy relationship with nutritious foods and an effective way to increase fruit and vegetable consumption among children. Participants showed agreement with these statements through their positive endorsement of statements 1, 2, 36, 29, and 30. Factor one also acknowledges the ability

of FTS programs to educate students on multiple topics including nutrition and agriculture. Overall the top ranked statements of factor one loaders are related to the benefits to children (Table 4.2). Additionally, factor one loaders seemed to think about FTS programs more holistically. Factor one loaders categorized all 16 'positive' statements, as show in Appendix K, on the positive side of the grid.

Statements ranked as most *disagree* did not support FTS programs or stated that funding should be cut and that FTS programs are not beneficial. The bottom ranked statements (18, 26, 5, 43, 45) all state that FTS programs do not benefit children, communities, schools and health. Furthermore, statement 43 claims that funding for FTS should be cut. Participants who loaded onto factor one placed these statements (18, 26, 5, 43, 45) at -4 and -3. Based on statistically significant z-scores, calculated by the KenQ software, those who loaded onto factor one strongly disagreed with these statements.

Table 4.2 Factor 1: Top 5 and Bottom 5 Statements Based on Level of Agree/Disagree

Statement #	36	1	2	29	30
Top 5 Statements (positive Z-Scores)	Farm to school programs don't just feed students, it educates them. (+4)	Farm to school can help children foster a positive relationship with healthy foods. (+4)	Children are more likely to eat vegetables when they grow them. (+4)	Farm to school programs are a good way to increase fruit and vegetable consumption among children. (+3)	Children should be taught to grow food as part of their schooling. (+3)
Statement #	18	26	5	43	45
Bottom 5 Statements (negative Z-Scores)	Farm to school programs do not enrich a child's education. (-4)	Farm to school programs do not have a community impact.	Farm to school programs are not related to public	Federal funding for farm to school programs should be cut from the 2010 Healthy, Hunger	Farm to school programs do not benefit communities. (-3)

		(-4)	health. (-4)	Free Kids Acts (-3)	

4.3.3 Viewpoint 2: Advocates for Legislative Change

There were only two participants who loaded onto factor two. In general, it is recommended that a minimum of three participants load onto a factor for it to be considered, however, Q methodology allows the researcher flexibility to decide the significance of a factor. Factor two accounted for 16 percent of the study's variability. The participants who loaded onto factor two consisted of one woman and one man of differing age categories, stakeholder groups, and races (Table 4.4). These two participants ranked statements related to legislation as *most agree.* Based on the z-scores, the top five statements that represent this viewpoint include statements, which support legislation and curriculum implementation in order to sustain a FTS program. The participants who loaded onto factor two also strongly expressed that agricultural education is not adequately incorporated into most public schools in the US (statements 8, 30, 21, 47, 7).

Based on statistically significant z-scores calculated by the KenQ Software, the statements ranked *most disagree* included statements about the impact of FTS programs on students and communities (statements 11, 43, 48,17, 5). These statements implied that participants do not believe FTS programs address food system inequities or local eating patterns. These statements also show that participants do believe FTS programs should be funded and topics are not adequately covered in schools. The top five and bottom five statements ranked for factor two are listed in Table 4.3.

Table 4.3 Factor 2: Top 5 and Bottom 5 Statements Based on Level of Agree/Disagree

Statement #	8	30	21	47	7
Top 5 Statements (positive Z-Scores)	In many parts of the U.S. elementary school students do not receive agricultural education related to the current food and agriculture system. (+4)	Children should be taught to grow food as part of their schooling. (+4)	There are few financial incentives for farmers to participate in farm to school programs in southwestern Virginia. (+4)	Farm to school programs can create a link between schools and communities. (+3)	Government legislation should not require schools to implement farm to school programs. (+3)
Statement #	11	43	48	17	5
Bottom 5 Statements (negative Z-Scores)	Farm to school topics are already covered in elementary schools in southwestern Virginia. (-4)	Federal funding for farm to school programs should be cur from the 2010 Healthy, Hunger Free Kids Act. (-4)	Farm to school programs can teach children and adults how we used to eat in the past. (-4)	Farm to school programs address food system inequities by expanding all students' access to high quality, local fruits and vegetables. (-3)	Farm to school programs are not related to public health. (-3)

4.3.4 Consensus and Distinguishing Statements Across the Two Factors

The statements with the highest amount of consensus were numbers **3** (-1, -1), **10** (-3, -3), 13 (0, 0), **31** (-1, -1), **33** (1, 1), **37** (1, 1), and **47** (3, 3). Consensus is defined, is this study, as being sorted the same by participants. Based on this consensus and the post card-sort questionnaire, participants overwhelming exposed that FTS programs have the ability to significantly increase children's nutritional knowledge (statement 10). Participants also expressed strong positive opinions regarding FTS programs as an organic way to create a connection between schools and communities (statement 47). Statements 3, 13, 31, 33 and 37 were more area specific and

participants mentioned that they were unsure of the accuracy of these statements. In other words, these statements were specific to economics, teaching, and agricultural legislation; topics that most participants were not experts in. For these reasons, these statements were ranked between -1 and 1 with both factors, meaning that participants did not have strong beliefs about these statements.

Statements with the most disagreement were related to sustainability, financial incentives, and health outcomes for children. Statements that participants had varying perspectives on were numbers **19** (2, -2), **21** (0, 4), **26** (-4, 0), **29** (3, -2), **32** (-2, 2), **36** (4, 0), **38** (-2, 2), **40** (-2, 3), **41** (2, -2), and **48** (1, -4). The views of the stakeholder were most apparent in this comparison, when also considering the post card sort questionnaire. Statement 19 refers to the environmental sustainability of local foods. Viewpoint one supported this view, while viewpoint two disagreed with this view. The post-card sort questionnaire revealed that participants who loaded onto factor two disagreed due to the inability of local foods to meet community-wide food needs. Statement 21 refers to the financial incentives for farmers to participate in FTS. Most participants stated that they did not know, while the participants who aligned with viewpoint two strongly agreed that there are not adequate incentives. Statement 26 refers to the community impact of a FTS program. Twelve out of 14 participants believed FTS programs do have a community impact while two participants felt impartial as to whether FTS programs can create a community-wide impact. Statements 29, 32, 36, 41, and 48 are all related to the health outcomes for children when a FTS program is implemented. P-sets that were part of viewpoint one sorted these statements on the positive side of the grid, 'most agree'. P-sets that were part of viewpoint two either felt neutral or disagreed with statements supporting FTS programs as a way to improve children's

diet quality and fruit and vegetable consumption. Statement 38 is related to the resources available to implement a FTS program in Montgomery County. Viewpoint one believes Montgomery County has enough resources and viewpoint two believes Montgomery County might not have enough resources to implement a FTS program. The last statement, 40, states that children do not want to be educated on topics they do not care about. Viewpoint one did not support this statements and viewpoint two aligned with this statement.

Based on post-card sort questionnaires, participants were most likely to sort statements under '0' that they were unsure about or uneducated about. Nearly every participant expressed that the statements under '0' were statements that were too specific and they did not have enough knowledge about the topics. The statements most commonly sorted under 0 are shown in table 4.4.

Statements 1, 2, and 36 were most likely to be sorted positively with 57% of participants sorting statements 1 and 2 as a +3 or +4 and 64% of participants sorting statement 36 as +3 or +4. No participants sorted statements 1 or 2 as negative and only 2 participants sorted statements 36 as negative.

Statements 5, 18, and 26 were most likely to be sorted negatively. Statement 5 was ranked as a -3 or -4 by 50% of participants and was ranked negatively 93% of the time. Statement 18 was ranked into -3 or -4 by 57% of participants and was ranked overall negatively overall by 93% of participants. Statement 26 was ranked as a -3 or -4, 43% of the time. Overall statement 26 was ranked negatively 86% of the time.

Table 4.4 Statements sorted into '0 Column' by Farm to School Stakeholders

Factor 1 Rank	Factor 2 Rank	Statement
0	0	3. Teachers have enough topics required to be covered by the state without a farm to school component.
0	0	9. Farmers may benefit from farm to school programs, but they may not be profitable in the long term.
0	0	15. Schools that want to participate in farm to school programs, still end up buying from big, national companies who pose as 'local' and 'organic 'food producers.
0	0	16. Not enough schools participate in farm to school programs to see an environmental impact to reduce greenhouse gas emissions related to agriculture in southwestern Virginia.
0	0	21. There are few financial incentives for farmers to participate in farm to school programs in southwestern Virginia.
0	0	22. Farmers are not adequately compensated for their produce or meat when they sell to school foodservice customers.
0	0	33. Farm to school programs provide communities with local economic stimulus.
0	0	35. Farm to school is talked about as a success, but small local farmers are still struggling to make long lasting business contracts with schools.
0	0	38. Montgomery County Schools do not have adequate resources needed to properly create a farm to school curriculum.
0	0	44. Farm to school programs have limited impact on protecting the environment.

Table 4.5 Participants' Demographic Profile by Viewpoint (n=14)

	Viewpoint 1	**Viewpoint 2**
Participants (n)	12	2
Sex		
Women	7	1
Men	5	1
Race		
White/Caucasian	10	1
Hispanic	1	0
Black/African American	0	1
Other	1	0
Age (years)		
18-24	2	0
25-34	3	1
35-44	5	0
45-54	0	1
55-64	2	0
Stakeholder Group		
Teacher/principal	3	0
Farmer	2	1
Government agency employee	2	1
Parent	4	0
School nutrition employee	1	0

4.4 Post Card-Sort Questionnaire

After completing the card sort grid, participants were asked a series of six questions related to how they sorted the statements on the card sort. Many participants had similar thoughts related to how and why they sorted the statements accordingly. Their responses are summarized and compiled in Table 4.5. Based on an analysis of these statements participants believe that FTS programs can connect schools to communities and can influence a child's education and nutritional knowledge and benefit children.

The statements below are paraphrased and compiled quotations from participants organized by question.

Table 4.6 Participants' Post Q Sort Responses

Question 1: What did you think as you sorted the farm to school statements?	
Farm to school should exist in Montgomery County, but it should not be mandatory. -*Farmer*	Teachers do have a lot of topics to cover, but if a teacher believes in the value of local foods, it would be easy enough to incorporate a curriculum. -*Teacher*
Small farmers need education on producing the most nutritious foods and on how to make small farms profitable. -*Farmer*	Kids don't always know what they want to learn, it needs to be introduced to them. -*Parent*
Farm to school doesn't currently work because we don't have the infrastructure, and our community doesn't have enough farms to support the volume needed for all the schools. Also, purchasing local foods for the NSLP doesn't usually allow for fair pricing for farmers because school budgets are too small. –*Government agency employee*	FTS is a great idea, but a lot of money needs to be invested that counties in Southwestern Virginia don't have. -*Teacher*
Farm to school cannot be done everywhere	Farm to school programs are not something

or all year long, but in this region it could definitely be used at least for a few items like potatoes and onions. -*Parent*	I think about very often. They need to be introduced to the community to get people thinking. –*Teacher*
Question 2: Explain why you sorted the farm to school statements in the 'most agree' +4 pile.	
Kids benefit from knowing where their food comes from, how it is grown and sustainable lifestyle behaviors. -*Farmer*	US students need more agriculture education because most schools do not offer it. –*Government agency employee*
There should not be governmental control over farm to school programs and curriculum. Students are interested in what they like, it cannot be forced upon them. Community based education is better than incorporating a curriculum anyways. -*Farmer*	Southwest Virginia schools need more plant-based agricultural education. There is some animal husbandry education, but nothing about growing plants. -*Farmer*
Farm to school programs do address inequities in accessing local foods and addresses inequalities by allowing everyone access to local foods regardless of socioeconomic status. –*Government agency employee*	Farm to school programs help educate kids on agriculture and self-sufficiency, such as being able to grow their own foods. So many kids are so clueless these days. –*Government agency employee*
A lot more people would be vegetarian if they ever went to a chicken farm. My son didn't realize bacon was from a pig until just the other day…kids should learn this type of thing at school. –*Parent*	When kids know about they're food they eat healthier foods. Everything is connected to food and when they are produced locally, foods can be used locally, and are distributed throughout the community more easily. -*Teacher*
A farm to school program is a great way to create a link between schools and communities. It would also be a great way to incorporate education in a hands-on setting. -*Teacher*	Curriculum is extremely important in order for there to be an educational component that the students understand which will enrich student's education. -*Parent*
Questions 3: Explain why you sorted the farm to school statements in the 'most disagree' -4 pile.	
Farm to school topics are definitely not covered in Virginia schools. -*Farmer*	Student health/public health is a huge component of farm to school programs because food directly affects health. -*Government agency employee*
A farm to school program could be profitable in the long term, like 10 years down the road, but not immediately. -*Farmer*	Lots of kids rely on free and reduced price lunch and breakfast, sometimes that's their only meal that day, so if that food were high quality and included fruits and veggies students would definitely gain health benefits. -*Teacher*
There will never be enough local foods.	Federal funding should NOT be cut to

-*Farmer, Government agency employee, teacher*	schools at all, including funds for farm to school programs. Farm to school is one of the best ways to enrich a child's education and does so in a way that students would care about. -*Parent*
Farm to school programs do enrich education and SWVA needs farm to school programs, especially since it's so agricultural. -*Parent*	Local foods are more sustainable. -*Parent*
Question 4: Explain why you sorted the farm to school statements under the 0 column.	
These statements seemed subjective and hard to definitely agree or disagree with. The answered seemed to 'depend' for most of these. Farm to school will work for some schools, but not all. -*Farmer*	Farm to school program success is very dependent on school commitment. -*Teacher*
These statements did not elicit a strong reaction. For many of these statements you could make an argument for both sides. -*Parent*	Was unsure or uneducated about these statements. Out of area of expertise. *–Parent, teacher, School nutrition director*
Question 5: Describe which statements you have the strongest support for and why.	
Kids are more likely to eat stuff when they're involved in the process (growing, cooking, etc). -*Farmer*	We don't have enough local food volume to meet the price point schools needs. *–Government agency employee*
Hands on activities are great for children to learn and farm to school programs lend themselves to hands on activities. Having kids plant seeds and then eat healthy food will instill healthy behaviors more than just saying eat this not that. -*Teacher*	When children know and learn how to grow and cook foods they become a more capable person. They grow and can contribute. Also, there is less waste with local foods and when kids learn appreciate food more. -*Teacher*
Question 6: What future actions do you think need to be made to institutionalize and sustain a farm to school program in Montgomery County, Virginia.	
Localities need to identify farmers who are willing to participate and go from there. *–Government agency employee*	If local foods were subsidized in the same amount that corn and soy were subsidized, local foods would cheaper to produce and would be cheaper to buy. -*Farmer*
More money needs to be given to the counties/districts, and counties should distribute the money for these programs. Farm to school should not be funded at the federal level. The programs need to	Schools need to look at the cafeteria budgets and see if it is plausible to change where certain items are sourced. Also, they need to identify common products that could be sourced locally such as potatoes.

become sustainable at the local level because if they rely on federal funding then it could stop at any time. -*Farmer*	Then schools should be matched up with farms. Schools also need to use resources such as cooperative extension, Virginia Tech, ect. to help implement these programs and take some of the burden off schools. –*Government agency employee*
Schools need to be in contact with local farms to see who can meet the demand. Schools then need to be paired with farms and then each school can use that farms goods, do farm visits to that farm, ect. Adults also need to be educated. -*Parent*	Montgomery County needs community involvement/outreach and financial incentive for schools to implement a farm to school program. If Blacksburg High School can get Domino's pizza then they can get local foods. -*Teacher*
People need to be educated about what farm to school is, how it would be implemented, and the benefits to the kids and community. Adults need to know and the knowledge will trickle down through the community. -*Parent*	There needs to be a fundamental mindset shift as far as cafeteria workers go. Cafeteria workers used to cook meals from ingredients, not just reheat frozen foods. If cafeteria employees start cooking again, the kitchens will be working and schools would have the ability to process foods during the summers to freeze fresh produce and to use throughout the school year. -*Teacher*
Farmers should develop a co-op so that they have leverage with schools and if one farmer has a bad season/doesn't grow something, the other farmers in the co-op can pick up the slack. -*Parent*	We don't need to institutionalize and sustain a farm to school program. Resources to support 4H, Boy Scouts, Girl Scouts, local churches, community parks and recs are a much better way to expand Farming education. –*School nutrition director*
Virginia Cooperative Extension agriculture agents and nutrition education agents could both be good resources for sourcing local products, identifying potential producers who would be willing to sell to schools, and developing some in-school learning opportunities that tie classrooms with cafeterias. –*Government agency employee*	Montgomery County has indicated difficulty in sourcing local foods and establishing a distribution system between the schools, which are a significant distance between them. Using the regional Farm to School Network to identify partners and work through distribution and sourcing issues seems to be critical for Farm to School success in southwest Virginia. –*Government agency employee*

The quotations in Table 4.6 are the same quotations from Table 4.5, however in Table 4.6 the quotations have been organized based on the conceptual framework used to guide this research (Figure 3.1). Table 4.6 consists of the four defined areas of influence for FTS programs, public health, community development, education, and environmental quality. Quotations from stakeholder interviews are categorized accordingly. The statements show the spectrum of opinions and influence, as viewed by FTS stakeholders in southwestern Virginia.

Table 4.7 Participants' Post Q sort Responses Based on Conceptual Framework

Public Health	
Farm to school programs do address inequities in accessing local foods and addresses inequalities by allowing everyone access to local foods regardless of socioeconomic status. –*Government agency employee*	When kids know about they're food they eat healthier foods. Everything is connected to food and when they are produced locally, foods can be used locally, and are distributed throughout the community more easily. -*Teacher*
Student health/public health is a huge component of farm to school programs because food directly affects health. -*Government agency employee*	Lots of kids rely on free and reduced price lunch and breakfast, sometimes that's their only meal that day, so if that food were high quality and included fruits and veggies students would definitely gain health benefits. -*Teacher*
Kids are more likely to eat stuff when they're involved in the process (growing, cooking, etc). -*Farmer*	Hands on activities are great for children to learn and farm to school programs lend themselves to hands on activities. Having kids plant seeds and then eat healthy food will instill healthy behaviors more than just saying eat this not that. -*Teacher*
Community Development	
Farm to school should exist in Montgomery County, but it should not be mandatory. -*Farmer*	Farm to school is a great idea, but a lot of money needs to be invested that counties in Southwestern Virginia don't have. -*Teacher*
Farm to school doesn't currently work because we don't have the infrastructure, and our community doesn't have enough farms to support the volume needed for all the schools. Also, purchasing local foods	There should not be governmental control over farm to school programs and curriculum. Students are interested in what they like, it cannot be forced upon them. Community based education is better than

for the NSLP doesn't usually allow for fair pricing for farmers because school budgets are too small. *–Government agency employee*	incorporating a curriculum anyways. *-Farmer*
A farm to school program is a great way to create a link between schools and communities. It would also be a great way to incorporate education in a hands-on setting. *-Teacher*	A farm to school program could be profitable in the long term, like 10 years down the road, but not immediately. *-Farmer*
These statements seemed subjective and hard to definitely agree or disagree with. The answered seemed to 'depend' for most of these. Farm to school will work for some schools, but not all. *-Farmer*	We don't have enough local food volume to meet the price point schools needs. *–Government agency employee*
Localities need to identify farmers who are willing to participate and go from there. *–Government agency employee*	More money needs to be given to the counties/districts, and counties should distribute the money for these programs. Farm to school should not be funded at the federal level. The programs need to become sustainable at the local level because if they rely on federal funding then it could stop at any time. *-Farmer*
Schools need to be in contact with local farms to see who can meet the demand. Schools then need to be paired with farms and then each school can use that farms goods, do farm visits to that farm, ect. Adults also need to be educated. *-Parent*	Farmers should develop a co-op so that they have leverage with schools and if one farmer has a bad season/doesn't grow something, the other farmers in the co-op can pick up the slack. *-Parent*
Virginia Cooperative Extension agriculture agents and nutrition education agents could both be good resources for sourcing local products, identifying potential producers who would be willing to sell to schools, and developing some in-school learning opportunities that tie classrooms with cafeterias. *–Government agency employee*	Schools need to look at the cafeteria budgets and see if it is plausible to change where certain items are sourced. Also, they need to identify common products that could be sourced locally such as potatoes. Then schools should be matched up with farms. Schools also need to use resources such as cooperative extension, Virginia Tech, ect. to help implement these programs and take some of the burden off schools. *–Government agency employee*
Montgomery County needs community involvement/outreach and financial incentive for schools to implement a farm to school program. If Blacksburg High	We don't need to institutionalize and sustain a farm to school program. Resources to support 4H, Boy Scouts, Girl Scouts, local churches, community parks

School can get Domino's pizza then they can get local foods. -*Teacher*	and recs are a much better way to expand Farming education. –*School nutrition director*
Education	
Small farmers need education on producing the most nutritious foods and on how to make small farms profitable. -*Farmer*	Farm to school programs are not something I think about very often. They need to be introduced to the community to get people thinking. -*Teacher*
Teachers do have a lot of topics to cover, but if a teacher believes in the value of local foods, it would be easy enough to incorporate a curriculum. -*Teacher*	Kids benefit from knowing where their food comes from, how it is grown and sustainable lifestyle behaviors. -*Farmer*
Kids don't always know what they want to learn, it needs to be introduced to them. -*Parent*	A lot more people would be vegetarian if they ever went to a chicken farm. My son didn't realize bacon was from a pig until just the other day…kids should learn this type of thing at school. –*Parent*
US students need more agriculture education because most schools do not offer it. –*Government agency employee*	Southwest Virginia schools need more plant-based agricultural education. There is some animal husbandry education, but nothing about growing plants. -*Farmer*
Farm to school programs help educate kids on agriculture and self-sufficiency, such as being able to grow their own foods. So many kids are so clueless these days. –*Government agency employee*	Curriculum is extremely important in order for there to be an educational component that the students understand which will enrich student's education. -*Parent*
Farm to school topics are definitely not covered in Virginia schools. -*Farmer*	Farm to school programs do enrich education and SWVA needs farm to school programs, especially since it's so agricultural. -*Parent*
Federal funding should NOT be cut to schools at all, including funds for farm to school programs. Farm to school is one of the best ways to enrich a child's education and does so in a way that students would care about. -*Parent*	People need to be educated about what farm to school is, how it would be implemented, and the benefits to the kids and community. Adults need to know and the knowledge will trickle down through the community. -*Parent*
There needs to be a fundamental mindset shift as far as cafeteria workers go. Cafeteria workers used to cook meals from ingredients, not just reheat frozen foods. If cafeteria employees start cooking again, the kitchens will be working and schools would have the ability to process foods	

during the summers to freeze fresh produce and to use throughout the school year. -*Teacher*	
Environmental Quality	
Farm to school cannot be done everywhere or all year long, but in this region it could definitely be used at least for a few items like potatoes and onions. -*Parent*	There will never be enough local foods. -*Farmer, Government agency employee, teacher*
Local foods are more sustainable. -*Parent*	Farm to school program success is very dependent on school commitment. -*Teacher*
When children know and learn how to grow and cook foods they become a more capable person. They grow and can contribute. Also, there is less waste with local foods and when kids learn to appreciate food more. -*Teacher*	If local foods were subsidized in the same amount that corn and soy were subsidized, local foods would cheaper to produce and would be cheaper to buy. -*Farmer*
Montgomery County has indicated difficulty in sourcing local foods and establishing a distribution system between the schools, which are a significant distance between them. Using the regional Farm to School Network to identify partners and work through distribution and sourcing issues seems to be critical for Farm to School success in southwest Virginia. –*Government agency employee*	

Chapter 4 Reference

1. 1. Coogan J HN. Q methodology: an overview. *Research in Secondary Teacher Education.* 2011;1(2).

Chapter 5 Discussion

This study utilized Q methodology in order to get a better understanding of stakeholders' perspectives on FTS programs in southwestern Virginia. Q methodology is a unique way to quantitatively and qualitatively measure and understand a person's subjectivity.[1] This is the first study to use Q methodology to explore the views and subjectivity of people regarding the benefits, challenges and opportunities of FTS programs. Fourteen FTS stakeholders were recruit to complete a Q methodology study in order to gain an understanding of the values system of FTS stakeholders and increase awareness of the thoughts surrounding FTS programs in southwestern Virginia.

5.1 Unique Stakeholders' Views

The findings of this study show that of the sample group of stakeholders in southwestern Virginia, mostly support FTS program implementation. Of the 14 participants who completed this study, the majority of participants (85.7%) have strong positive views towards the implementation of FTS programs and activities related to the promotion of agriculture and local foods. Furthermore, the majority of participants (85.7%) strongly agreed that the potential benefits of FTS programs to children are meaningful. Two of the 14 participants also had positive feelings towards FTS programs, but placed less value in the benefits to children and viewed FTS programs as an ineffective way to improve health behaviors among children.

Overall, parents recognized the benefits of FTS more easily than other stakeholder groups. When looking at the 16 statements (Appendix K) considered 'positive' or supportive of FTS programs, parents, collectively, categorized these statements higher than any other stakeholder group. Of

the 16 positive statements included within the Q-set, eight of these statements were organized at a higher number than any other stakeholder group. While parent input and support is important in sustaining a FTS program, parents may view FTS programs more positively than other stakeholder groups because they may be further removed from the logistics of implementing a FTS program. All other stakeholder groups would be involved in the direct implementation of an FTS program (teachers, school nutrition employees, farmers, government agency employees).

5.2 Post-Card Sort

The results of the post card-sort questionnaire showed common patterns shared among teachers and parents, but not other stakeholder groups. The three teachers interviewed all believed it would be beneficial for their students to have a FTS program and accompanying educational curriculum. One of the barriers to implement a FTS program can be to create buy-in from teachers due to the extra burden FTS programs and curriculum can place on them. Additionally, having adequate funding to implement programs was addressed as a barrier for schools. As previously mentioned, successful FTS programs are often accompanied by an educational curriculum such as the CATCH curriculum, or the FoodSpan curriculum.[2, 3] CATCH incorporates hands-on interdisciplinary activities such as farm visits, nutrition education, and school gardens.[3] FoodSpan is a classroom-centered curriculum with discussion questions, PowerPoint presentations and handouts provided. The goal of FoodSpan is to educate students with thought-provoking ideas.[2] Both of these curriculums have either been designed for or can be adapted to meet the needs of elementary school children. Furthermore, both of these curriculums utilize interdisciplinary techniques to educate students.

Another point emergent theme from the post Q-sort questionnaire was the need for general, community-wide education about local foods, agriculture and nutrition. Multiple participants (n=5) specifically stated that FTS is an important topic, but not something people think about on their own. For example, one participant (a teacher) stated, "A farm to school program would be awesome, but I've never thought about it until this study." A successful FTS program needs the support of passionate stakeholders who can be recruited through community awareness of the local foods available, and the ability to use local foods in schools. In order to recruit stakeholders, Montgomery County and southwestern Virginia should make efforts to educate the general public about local foods and FTS initiatives.

5.3 RO3 Results and Analysis

Research Implications

Further research needs to be done in order to better understand the measurable health, economic, environmental and community benefits of FTS programs. As outlined in this study, these are the four main thematic areas that FTS programs have been shown to impact. For more than a decade now, overweight and obesity rates of American children have grown to unsustainable levels and research is constantly looking towards solutions to the 'obesity epidemic' among US youth.[4] There is currently limited, but promising evidence that shows the potential for FTS programs to have a positive impact on student health in terms of fruit and vegetable consumption and chronic disease prevention.[5, 6] However, more research is needed in the area of health outcomes from FTS programs. For example, the degree to which FTS programs help children meet the DGA's fruit and vegetable goals also needs to be measured and documented. By providing sufficient evidence of the health benefits to children, FTS programs may be able to acquire more funding

with increased reliability. As of now, schools are able to apply to the FTS Grant Program to acquire funds to implement a FTS program, but grant funding is not always reliable and increased competition may reduce the percentage of schools that are awarded funding, from this already competitive grant. The FTS Grant Program is not the only source of funding for FTS programs. The Virginia Department of Education also receives Team Nutrition Training Grants, which are another source of funding for FTS programs. However, the FTS Grant Program it is the most common source of funding and what will be focused on in this thesis.

Beyond the health outcomes of FTS programs, there is a research gap in determining the benefits to communities and local economies when FTS programs are implemented. Interdisciplinary research could be used to determine the economic impact on a community and other benefits and challenges a community may face when a FTS program is implemented. If the results of this type of research were positive, this may also help to recruit support form local-level governmental official in supporting the implementation of a FTS program.

An additional area of research that is currently lacking is systematic observation and analysis of successful FTS programs and the surrounding communities. Some of the most successful and sustained FTS programs around the US are found in California, Northern Florida, Boston, Massachusetts, New Hampshire, Vermont and Illinois.[7] Despite growing success, there is little research on the commonalities in how the most successful programs begin, recruit support, acquire adequate funding and farmers, and implement their programs. Similar to how different organizations have created curriculum to be used in the classroom, a curriculum could be created in order to instruct a community on how to begin the implementation process of a FTS program.

Additionally, there has been research on the success of FTS programs overall increasing fruit and vegetable intake, but the components of FTS programs have not been analyzed in isolation. That is, it is unclear which aspects of FTS are most important towards influencing health behaviors. FTS programs commonly include an in-class curriculum, hands-on activities, schools gardens, taste-tests, farm visits, and utilization of local foods in school meals. By defining the most influential of all of these FTS aspects, new FTS programs could concentrate efforts to the most beneficial aspects of FTS to make program implementation more manageable.

Yet another important gap in the existing FTS literature is the views of children in regards to FTS programs. Arguably the most important stakeholder group to recruit buy-in from, childrens' views on FTS programs and program activities need to be better studied and considered in order to help create more successful programs. By better understanding what children find enjoyable in FTS programs, curricula and program implementation materials can be reevaluated to help create better programs.

Policy Implications

In addition to the research needed surrounding FTS programs and program implementation, policy will guide the trend of FTS program utilization. Huge strides have been made towards backing FTS programs with policy. According to the National FTS Network, 46 out of 50 states have legislation that supports FTS programs.[8] The largest FTS related legislation, however, is found in the Farm Bill, which appropriates money for the USDA's Farm to School Grant Program. The FTS Grant program is a commonly used means to acquire funding for new and existing FTS programs. In order to better sustain and support communities in building FTS

programs, funding needs to be more reliable, consistent, and widely available. As of now, schools have to apply for grant funding from the FTS Grant Program. This grant process is competitive, only awarding 73 grants for the 2018-2019-school year.[9] These grants total $5.2 million dollars, which is significant but not sufficient. If every applicant to the FTS Grant Program received funding, it would equal $21 million dollars, which leaves room for expansion in terms of FTS program funding.[10] In order to make FTS programs more widespread and accessible to any school that is interested, funding needs to be more widely available. One participant suggested creating local funding sources for FTS programs so that these local-level programs are not reliant on federal funds for program sustainment. Additionally, FTS program legislation needs to more specifically support the procurement of local foods. The 2018 Farm Bill failed to articulate regulatory flexibility to allow the utilization of local goods by school food authorities.[11] Creating legislation that supports school food authorities in procuring local goods would aid in the accessibility and implementation FTS programs for all schools.

Incentives also need to be made in order to increase utilization of FTS programs. In Virginia, there is no clear financial incentive for farmers or schools to implement a FTS program. Considering the post-card sort questionnaire responses, schools and farmers in southwestern Virginia would be more likely to implement a FTS program if there was a financial incentive, such as a tax deduction. This type of incentive would need to be imbedded within legislation and advertised to stakeholder groups (schools and farmers). Another way to potentially incentivize FTS programs would be to subsidize local goods used in FTS programs. Currently, the majority of farm subsidies are distributed to corn, wheat, cotton, and soybean production, a list which has largely stayed the same over the past decade.[12] Appropriating money to local economies to

distribute to local farmers producing goods for FTS programs could incentivize local farmers with a guaranteed income. This would reduce the risk for farmers and could also help create a farm co-operative of local farmers to reduce the risk for schools as well. That is, if a farm's crop is unproductive one year, a co-operative could create interdependency among local farmers to ensure the schools receive the quantity of local goods they had planned for the school year.

Table 5.1 Actions to Implement and Sustain a FTS Program in Southwestern Virginia

Selected Stakeholder	**Current Situation**	**Future Actions**
USDA	FTS Grant Program (most common source of funding for FTS programs)	More money needs to be appropriated to this program. As of the 2018-2019 school year, 73 grants totaling $5.2 million dollars were distributed for FTS programs and activities, but over $21 million dollars is needed to meet the needs of all schools looking to implement FTS programs.
VA General Assembly	Three Pieces of FTS Legislation: (1) established a Virginia-specific FTS website (2007); (2) created a FTS task force to research the best methods of implementing FTS programs throughout Virginia (2007); and (3) established Virginia's FTS week in November (2010)	Virginia needs to do more the ensure funding and support for FTS programs. A website, task force and statewide FTS week is not going to help schools implement and sustain programs.
Academia	Minimal research on the heath, economic, environmental and community outcomes of FTS programs	Research and evaluation need to be funded to analyze four defined areas of FTS: (1) Health outcomes of children (i.e. BMI, fruit and vegetable intake, blood lipid levels, etc.) (2) Economic effects on the local economy when a school food system begins utilizing local goods (3) The environmental effects and sustainability of utilizing local goods in a school food system (4) The benefits gained by communities when schools emphasize local goods

5.5 Study Strengths and Limitations

This study is the first study to utilize Q Methodology to analyze the views of diverse stakeholders regarding the benefit, challenges and opportunities for FTS programs in southwestern Virginia. This study introduces Q Methodology into the study of FTS programs and has future applications that could help localities implement FTS programs. By understanding stakeholder perspectives, localities will be better equipped to recruit support for programs and can use results from Q Methodology studies to increase the quality of grant applications by showing the reported support and views of stakeholders.

Stakeholder recruitment is an important aspect of any community-based intervention or program. FTS programs are growing in popularity and because of their interdisciplinary nature they are most successful when supported by many stakeholder groups. This study contributes to the empirical literature on stakeholders' views of FTS programs in southwestern Virginia by analyzing the views of a diverse set of stakeholders. This study utilized a small sample of stakeholders across five identified stakeholder categories to better understand how people in the community view FTS programs. While this study allowed for an in-depth analysis of stakeholder views, the sample size was small. Q methodology does utilize small sample sizes, but utilizing up to 30 people could have provided a more in-depth view of stakeholder views. Additionally, there was a lack of demographic diversity among the participants. The majority of participants were Caucasian and held, at minimum, a bachelor's degree. This is not representative of the southwestern Virginia population, which reduces the extent to which this study can be generalized to all of southwestern Virginia. While 95% of southwestern Virginia is Caucasian, only 8% hold a bachelor's degree.[13] Additionally, it is unknown whether this sample is

representative of FTS stakeholders in general, as there is no published literature looking at the demographics of FTS stakeholders.

The statements included in the card sort activity could be considered another limitation of the study. Many of the participants were parents or teachers and were unfamiliar with policies and laws surrounding FTS programs. For this reason, many participants placed these statements under '0' because they were unsure or did not have enough information on the subject. The top ten statements to be sorted into the '0 column' are listed in Table 4.5.When participants were asked why they sorted these statements under '0' they commonly explained that they simply did not know the answer or did not have enough knowledge about the content area to know.

Furthermore, in order to increase accessibility to this study, participants were able to opt to complete the Q-study in their work environments. In these cases, the study coordinator went to the participants' place of work to conduct the study. This presents a limitation because in many of the work environments there were many distractions for the participants. For example, one participant, a teacher, opted to do the study in the school where they worked. Throughout the duration of the study there were loud noises (children at recess) and other teachers distracting the participant. The participant did not recognize this as problematic, but it could have altered the way in which the statements were sorted in comparison to the participants who completed the study in a quiet room.

Despite some of the limitations of this study, it is also an exciting new area of research. This is the first study that explores the views of FTS stakeholders using Q methodology and defines

these stakeholder groups as an important part of implementation and sustainment of FTS in Montgomery County, Virginia.

Chapter 5 References

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Chapter 6 Conclusion

This research explored the views of diverse stakeholders regarding the benefits, opportunities and challenges of FTS programs and found two distinct viewpoints: *(1) Appreciators of Child-Centered Benefits and (2) Advocates for Legislative Change.* This was an exploratory study that found that a majority of diverse FTS stakeholders in southwestern Virginia view FTS programs positively and are able to recognize the benefits for children and communities. A majority of participants (85.7%) expressed strong positive views towards FTS programs and the benefits for children. All participants strongly agreed that children should be taught to grow their food as part of their education. Both viewpoints support the implementation of FTS programs and/or FTS activities. Those who loaded onto factor one valued the multi-faceted elements of FTS programs. Factor two loaders also viewed FTS programs positively, but acknowledged the logistical side of program implementation and advocated for legislative-level change prior FTS program implementation.

6.1 Implications for Policy and Research

Despite the overwhelming support for a FTS program in Montgomery County among this group of stakeholders, Montgomery County has no plans to implement an official FTS program or activities.[1] The National Farm to School Network outlines five steps to getting a FTS program started, including forming a team of diverse stakeholders, and promoting FTS in the community.[2] After completing participant interviews and analyzing the results from RO1 and RO2, it is clear that there is interest in Montgomery County to implement a FTS program, but there are necessary steps that would need to happen first. At each level of community, as defined in RO1, there are actions that can be taken to work towards implementation and sustainment of a FTS

program in Montgomery County Virginia. As outlined in chapter 5, there are still research gaps in the overall benefits of FTS programs and policies that need to be changed. The specific benefits to children and communities need to be measured in order to justify funding for FTS programs. Additionally, funding needs to be more widely available and localities need support to apply for funding when doing so for the first time. Overall, FTS programs need to be more widely supported and funded in order to make them accessible to all schools.

The implementation of FTS programs is a promising means to improve student health, bolster local economies and re-introduce local produce into a community's regular diet. Further research is needed to continue recruiting support from stakeholders, but national and state legislation can help make FTS programs a realistic option for more school systems.

Chapter 6 References

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Appendixes

Appendix A

October 24, 2018

Vivica I. Kraak, PhD
Virginia Tech
228 Wallace Hall
295 West Campus Drive
Blacksburg, Virginia 24061

Dear Dr. Kraak:

SUBJECT: REGULATORY OPINION—IRB EXEMPTION
Protocol Title: Stakeholders' Views about the Benefits, Challenges, and Opportunities of Primary Schools to Implement Farm to School Programs for Children in Southwestern Virginia
Investigator: Vivica I. Kraak, PhD
Protocol No.: 18-698

This letter is in response to your request to Western Institutional Review Board (WIRB) for an exemption determination for the above-referenced research project. WIRB's IRB Affairs Department reviewed the exemption criteria under 45 CFR §46.101(b)(2):

> (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:
> (i) Information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

We believe that the research fits the above exemption criteria. The data will be collected in a way so that the subjects can be identified, directly or through identifiers linked to the participants. However, any disclosure of the human subjects' responses outside the research will not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation. You have also confirmed that the

Office of Research Compliance
Institutional Review Board
North End Center, Suite 4120
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-3732 Fax 540/231-0959
email irb@vt.edu
website http://www.irb.vt.edu

MEMORANDUM

DATE: September 30, 2018

TO: Vivica I Kraak, Olivia Obertello

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires January 29, 2021)

PROTOCOL TITLE: Stakeholders’ Views about the Benefits, Challenges, and Opportunities of Primary Schools to Implement Farm to School Programs for Children in Southwestern Virginia

IRB NUMBER: **18-698**

Dear Investigator(s):

RE: Protocol Submission for WIRB Review

The Virginia Tech Institutional Review Board (IRB) office screened this study and determined that it is ready for WIRB review.

Please download the "Instructions for the PI to Transfer the VT IRB Protocol to WIRB":

https://www.research.vt.edu/irb/documents/wirb_submission_instructions.pdf

Please go to https://connexus.wcgclinical.com to complete the protocol submission process to the WIRB.

ATTENTION:

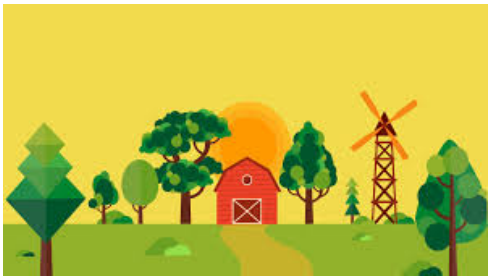
* Vivica I Kraak MUST BE LISTED AS THE PI ON THE WIRB SUBMISSION.

* All references to the VT IRB (including phone number and email address) MUST be removed from all study documents and replaced with Western IRB - (800) 562-4789, help@wirb.com.

Appendix B: Study Recruitment Flier

A Study that Explores Your Views about Farm to School Programs in Montgomery County, Virginia

September 2018



We want to understand your views about farm to school programs and the benefits, challenges, and opportunities for implementing programs in Montgomery County, Virginia. You are eligible to participate in this study if you are 18 years or older and are in one of these groups:

***Parent/caretaker** ***Local farmer**

***School Principal** ***Schoolteacher**

***School nutrition staff** ***State government employee**

Researchers at Virginia Tech in Blacksburg, Virginia will conduct this study that involves completing the following activities: (1) a consent form, (2) a demographic survey, (3) a statement card-sort, and (4) a post card sort questionnaire. This study will take between 60-90 minutes to complete.

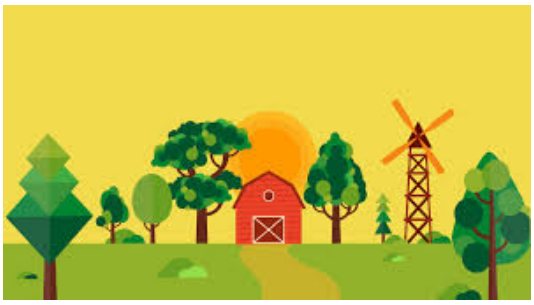
If you would like to participate, please contact Olivia Obertello, Research Coordinator at:

Email: oliviao6@vt.edu or Phone: (401) 207-7600

I look forward to hearing from you between September and December 2018!

Appendix C: Email Recruitment Flier

A Study that Explores Stakeholders Views about the Benefits, Challenges, and Opportunities of Primary Schools to Implement Farm-to-School Programs in Montgomery County, Virginia



You are invited to participate in a study about the benefits, challenges, and opportunities of farm to school programs. The principal investigator for this study is Dr. Vivica Kraak, an assistant professor in the Department of Human Nutrition, Foods, and Exercise at Virginia Tech in Blacksburg, Virginia. This study will explore your knowledge, attitudes, beliefs, and views about the farm to school programs.

The research findings will help to inform policies to support farm to school programs and inform stakeholders of necessary steps that must be taken in order to implement and sustain a farm to school programs in Montgomery County, Virginia. The results will also help us understand stakeholder's current views on farm to school programs.

We are seeking teachers, farmers, school nutrition staff, parents/caretakers, state legislators from Montgomery County, Virginia, who are 18 years or older to complete four activities taking 60-90 minutes. This study will be conducted in-person.

What are you asked to do?

1. Your participation in this study is completely voluntary, confidential and has limited risk. If you agree to participate, you will be asked to review and sign an informed consent form **(5-10 minutes).**

2. You will complete a few questions about your demographic profile including your age, sex, and race/ethnicity. You will be asked to review the instructions for the activity and will receive verbal instructions as well **(10-20 minutes).**
3. You will be given 48 cards, each one containing a statement related to farm to school programs. These cards are to be sorted into "most agree" and "most disagree" piles in a way that reflects your thoughts and opinions and record the results on the score sheet **(30-45 minutes).**

4. You will be asked to complete a six-item, post-card sort questionnaire with questions asking about the activity, thoughts you had during the activity, and future actions you think are needed to help implement and sustain farm to school programs **(15 minutes).**

Should you have any questions about the research, or if you are interested in participating in this study, please contact:

Olivia Obertello, Project Manager, Department of Human Nutrition, Foods, and Exercise, 338 Wallace Hall, 295 West Campus Drive, Virginia Tech, Blacksburg, Virginia 24061
Email: oliviao6@vt.edu; Phone: (401) 207-7600

Should you have any questions or concerns about the study's conduct or your rights as a research subject, or need to report research-related injury or event, you may contact:

Dr. David M. Moore, Virginia Tech IRB Chair
Email: moored@vt.edu; Phone: (540) 231-4991
IRB# 18-698

Appendix D

Master List of Study Activities

A Research Study that Explores Stakeholder's Views about the Benefits, Challenges, and Opportunities of Primary Schools to Implement Farm-to-School Programs for Children in Montgomery County, Virginia

Olivia Obertello, MS Candidate

Email: oliviao6@vt.edu

Phone: 401-207-7600

Activity 1: Adult Consent Form

Activity 2: Demographic Survey

Activity 3: Q Methodology Card-Sort for the FTS Program Study

Activity 4: Post Card-Sort Questionnaire

Appendix E

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
Informed Consent for Participants in Research Projects Involving Human Subjects
October 10, 2018

Title of Study: A Study of Stakeholders Views about the Benefits, Challenges, and Opportunities of Primary Schools to Implement Farm-to-School Programs for Children in Southwestern Virginia

Principal Investigator: **Vivica Kraak, PhD, RDN**
Assistant Professor
Department of Human Nutrition, Foods, and Exercise
223 Wallace Hall
295 West Campus Drive
Virginia Tech, Blacksburg, VA 24061
Email: vivica51@vt.edu; phone: (540) 231-9638

Co-Investigator: **Olivia Obertello, MS Student**
Department of Human Nutrition, Foods, and Exercise
338 Wallace Hall
295 West Campus Drive
Virginia Tech, Blacksburg, VA 24061
Email: oliviao6@vt.edu; phone: (401) 207-7600

I. Purpose of this Study

The purpose of this study is to explore your views on farm to school programs in Montgomery County, Virginia. As a stakeholder, you have a unique perspective regarding the benefits, challenges, and opportunities of implementation of a farm to school program. It is also to better understand how views of farm to school exist across diverse stakeholders. We are seeking participants, ages 18 or older, who are parents or caretakers of children who attend a Montgomery County Public Elementary School; principals, schoolteachers, and foodservice employees who work for a Montgomery County Public Elementary School; and state legislators and agencies. The research finings will help inform policy to implement, institutionalize, and sustain a farm to school program in Montgomery County, Virginia. The results of the study may be published or used for presentations, but you will not be identified in any publication or presentation of this study or its results.

II. Procedure

If you agree to participate in this study, you will be asked to:

(1) Read and sign this form to tell us that you want to participate in this study;
(2) Answer a few questions regarding your demographic profile (i.e., age, sex, and race/ethnicity) that will take approximately 5 minutes;
(3) Complete a sort of 48 statements related to farm to school programs in order of which statements you most agree with and most disagree with that will take you about 30 minutes to complete;
(4) Consent to answer some questions in a questionnaire related to the sort you have just finished. This should take approximately 15 minutes.

III. Risks

There are minimal risks associated with your participation in this project. The study will be reviewed and approved by the Virginia Tech Institutional Review Board. Your participation in this study is not required and you may end the interview at any time. You have the right to remain anonymous in the reporting of these results in scholarly publications and conferences.

IV. Benefits

There are no direct benefits to participate in this study other than to share your views, knowledge, and beliefs regarding farm to school programs.

V. Extent of Anonymity and Confidentiality

You have the right to remain anonymous for this study and your information will be kept confidential at all times and will be known only to the research team. Your responses to the brief questionnaire will obtain basic information about you including your name, affiliation, and contact information. This information will be stored separately from your responses for the activities and will be coded and kept confidential. Only trained researchers involved in this study will have access to identifiable information about you. At no time will the researchers release identifiable results of the study to anyone other than individuals working on the project without your written consent.

The Virginia Tech (VT) Institutional Review Board (IRB) may view the study's data for auditing purposes. The IRB is responsible for the oversight of the protection of human subjects involved in research.

Note: in some situations, it may be necessary for an investigator to break confidentiality. If a researcher has reason to suspect that a child is abused or neglected, or that a person poses a threat of harm to others or him/herself, the researcher is required by Virginia State law to notify the appropriate authorities. If applicable to this study, the conditions under which the investigator must break confidentiality must be described.

VI. Compensation

There is not compensation for participants who voluntary agree to be apart of this study.

VII. Freedom to Withdraw

It is important for you to know that you are free to withdraw from this study at any time without penalty. You are free not to answer any questions that you choose or respond to what is being asked of you without penalty.

Please note that there may be circumstances under which the investigator may determine that a subject should not continue as a subject.

Should you withdraw or otherwise discontinue participation, you will be compensated for the portion of the project completed in accordance with the Compensation section of this document.

VII. Questions or Concerns

Should you have any questions about this study, you may contact one of the research investigators whose contact information is included at the beginning of this document.

Should you have any questions or concerns about the study's conduct or your rights as a research subject, or need to report a research-related injury or event, you may contact the Virginia Tech Institutional Review Board at irb@vt.edu or (540) 231-3732.

IX. Subject's Consent

I have read the Consent Form and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent:

_____ Date_____

Signature of Participant

_____

Printed Name of Participant

(Note: each subject must be provided a copy of this form. In addition, the IRB office may stamp its approval on the consent document(s) you submit and return the stamped version to you for use in consenting subjects; therefore, ensure each consent document you submit is ready to be read and signed by subjects.)

Appendix F

Virginia Polytechnic Institute and State University

A Study of Stakeholders Views about the Benefits, Challenges, and Opportunities of Primary Schools to Implement Farm-to-School Programs for Children in Southwestern Virginia

Demographic Survey

1. Age
    a. 18-24 years
    b. 25-34 years
    c. 45-54 years
    d. 55-64 years
    e. >65 years
2. Ethnicity
    a. White/Caucasian
    b. African American
    c. Hispanic
    d. Asian American/Pacific Islander
    e. Other:_____
3. Highest level of education
    a. Some high school
    b. High school
    c. Some college
    d. Associate's degree
    e. Bachelor's degree
    f. Master degree
    g. Doctoral degree

h. Other:_____

4. Current occupation:_____

Appendix G

A Q Methodology Study of the Views of Stakeholders in Montgomery County, Virginia on the Benefits, Challenges, and Opportunities of Farm to School Programs

Exploring Your Views about Farm to School

Farm to school programs are taking place in schools across the county and are becoming increasingly popular. Farm to school programs can be implemented into the National School Lunch Program, the School Breakfast Program, or the Fresh Fruit and Veggie Program, as well as others. Farm to school programs purchase local produce, dairy, and proteins, and serve them at school. As of 2018, Montgomery County Public Schools do not support a farm to school program. This exercise will help us understand how you think about farm to school programs. There is no right or wrong answer. We want to learn about your own point of view. The card-sorting activity should take about 60 minutes to complete.

You will be given 48 cards to review with statements regarding farm to school programs and local food procurement. We want you to look over all the cards before sorting the statements. Statements should then be sorted into which statements you 'agree with most' and which statements you 'disagree with most' related to farm to school programs. You will have a score sheet with a distribution and boxes from -4 to +4. Please place one statement in one box to fill all of the 48 boxes. Feel free to ask the researcher any questions if something is not clear to you.

After you finish, a researcher will give you a questionnaire to complete to record your thoughts and views about the card-sort activity. The questions will also explore how you

think about farm to school programs and future actions that should be taken. This activity should take 15 minutes to complete.

Card-sorting instructions

1. Take the deck of 48 cards with the statements about farm to school programs, and sit at a table with the paper copy of the scoring grid. Each card has a statement on it, which describes or comments on an aspect of farm to school programs or local food procurement. The numbers on each card are random and do not mean anything special.

2. Flip through the 48 cards and sort them into three different piles:
    a. **Pile 1** for statements you **agree with most.**
    b. **Pile 2** for statements you do not view as something you agree with or disagree with or have mixed feelings about.
    c. **Pile 3** for statements you **disagree with most.**

3. Take the piles of cards with the statements you **agree with most** and select the top three that you ***agree the most*** to represent your views on farm to school programs. Place these three cards under the +4 box to the right side of the board.

    Continue to sort your **most agree with** statements by placing four statements under the +3 box, six statements under the +2 box, and seven statements under the +1 box, until you have placed one card in each box on the right side of the board with the scoring sheets. You do not need to rank the cards in each column.

4. Next, take the pile of cards in the **disagree with most** pile and select the top three that you ***disagree with most*** to represent yours views on farm to school programs. Place three cards under the -4 box on the left side of the board. Continue sorting your **disagree with most** statements by placing four

statements under the -3 box, six statements under the -2 box, and seven statements under the -1 box until you have placed one card in each box on the left side of the board. You do not need to rank the cards in each column.

5. Take the cards you have not yet scored and look over them. These are the statements you do not have an opinion on or you do not have strong opinions on whether you agree or disagree with them. Place eight cards in the 0 pile. Keep working until you have put a statement in each box. You do not need to rank the cards in each column.

6. When you have placed one card with a statement into each box on the board, look it over and you can change your mind and switch statements until you feel content about how you have sorted the cards.

7. After you finish the card sort, please write down the random numbers of each statement card on the score sheet. Afterwards, the researcher will ask you to complete a questionnaire that should take about 15 minutes. When you finish please let the researcher know.

Thank you for completing this activity.

Appendix H

48 Statements on Farm to School Programs

1. Children are more likely to eat vegetables when they grow them.

2. Farm to school can help children foster a positive relationship with healthy foods.

3. Teachers have enough topics required to be covered by the state without a farm to school component.

4. Children do not particularly care where their food comes from and how it is grown.

5. Farm to school programs are not related to public health.

6. Student health would not improve if we had a farm to school program in Montgomery County.

7. Government legislation should not require schools to implement farm to school programs.

8. In many parts of the U.S. elementary school students do not receive agricultural education related to the current food and agriculture system.

9. Farmers may benefit from farm to school programs, but they may not be profitable in the long term.

10. Incorporating a farm to school education into the classroom would not have a significant influence on improving students' nutrition knowledge.

11. Farm to school topics are already covered in elementary schools in southwestern Virginia.

12. Farm to school programs can encourage children to learn about environmentally conscious attitudes and behaviors.

13. Farm to school program success is not dependent on a curriculum.

14. Hands-on activities can be included at farmers' markets and community centers to engage children and families to promote the benefits local foods outside of school.

15. Schools that want to participate in farm to school programs, still end up buying from big, national companies who pose as 'local' and 'organic' food producers.

16. Not enough schools participate in farm to school programs to see an environmental impact to reduce greenhouse gas emissions related to agriculture in southwestern Virginia.

17. Farm to school programs address food system inequities by expanding all students' access to high quality, local fruits and vegetables.

18. Farm to school programs do not enrich a child's education.

19. Farm to school programs are environmentally sustainable and better for the environment than a traditional school foodservice program.

20. Farm to school programs do not positively impact students' health.

21. There are few financial incentives for farmers to participate in farm to school programs in southwestern Virginia.

22. Farmers are not adequately compensated for their produce or meat when they sell to school foodservice customers.

23. There are enough local foods.

24. Farm to school programs have the potential to increase the proportion of available local foods at grocery stores.

25. Most people do not care about the environmental impacts of their food choices.

26. Farm to school programs do not have a community impact.

27. Purchasing local foods is an environmentally friendly way to eat.

28. Farm to school programs will reduce participation in the National School Lunch Program.

29. Farm to school programs are a good way to increase fruit and vegetable consumption among children.

30. Children should be taught to grow food as part of their schooling.

31. The potential of the local foods movement to produce a positive impact is unknown.

32. Farm to school programs do not influence fruit and vegetable preference and consumption.

33. Farm to school programs provide communities with local economic stimulus.

34. Local foods are not more sustainable.

35. Farm to school is talked about as a success, but small local farmers are still struggling to make long lasting business contracts with schools.

36. Farm to school programs don't just feed students, it educates them.

37. Food producers will continue using chemicals despite the demands of farm to school programs in order to produce the biggest yield.

38. Montgomery County Schools do not have adequate resources needed to properly create a farm to school curriculum.

39. Farm to school programs can diversify the food producer market and create local jobs in communities.

40. Students don't want more education on topics they don't care about.

41. Children's diets improve when they learn where their food comes from and how it is produced.

42. Community engagement is an unrealistic outcome of a farm to school program.

43. Federal funding for farm to school programs should be cut from the 2010 Healthy, Hunger Free Kids Act.

44. Farm to school programs have limited impact on protecting the environment.

45. Farm to school programs do not benefit communities.

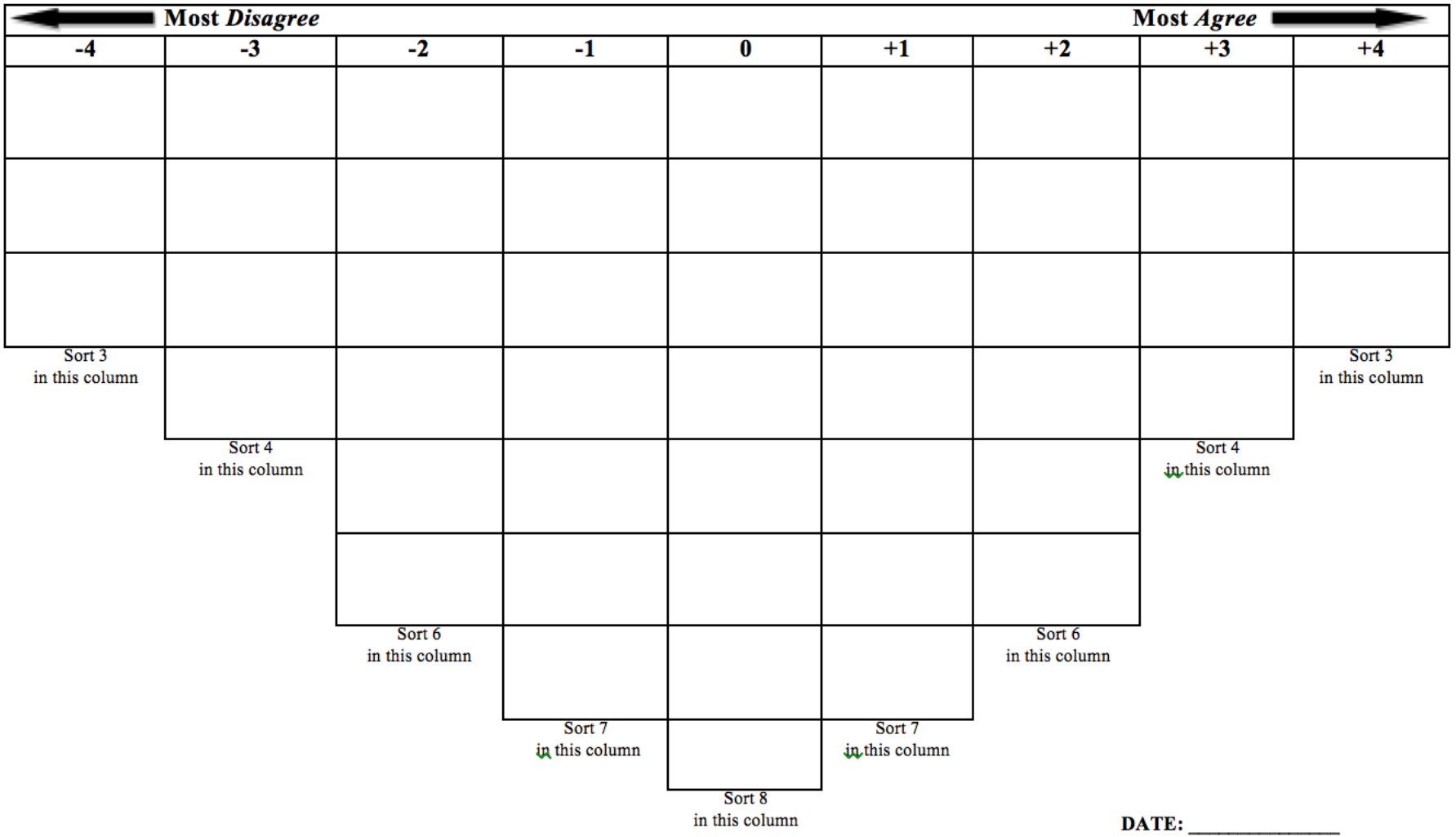
46. Students eat healthier when their school participates in farm to school programs.

47. Farm to school programs can create a link between schools and communities.

48. Farm to school programs can teach children and adults how we used to eat in the past.

Appendix I
Study Card Sort Grid

Exploring Your Views on Farm to School Programs in Montgomery County, Virginia
Card-Sorting Grid



Study ID: _____

DATE: _____

Appendix J
Example of a Completed Card Sort Grid

Exploring Your Views on Farm to School Programs in Montgomery County, Virginia
Card-Sorting Grid

← Most *Disagree*							Most *Agree* →	
-4	**-3**	**-2**	**-1**	**0**	**+1**	**+2**	**+3**	**+4**
32	**42**	**20**	10	21	24	35	27	1
6	45	26	43	4	8	17	36	30
18	34	23	28	15	37	12	14	2
Sort 3 in this column	5	3	44	22	29	47	41	Sort 3 in this column
	Sort 4 in this column	13	38	9	48	40	Sort 4 in this column	
		31	25	33	19	7		
		Sort 6 in this column	11	16	46	Sort 6 in this column		
			Sort 7 in this column	39	Sort 7 in this column			
				Sort 8 in this column				

Study ID: _____xx_____

DATE: _____xx/xx_____

Appendix K

Conceptual Model to Generate the Q Sample for the FTS Program Study

Q Sample (n=48 statements)	**Four Thematic Areas Related to Farm-to-School (FTS) Programs** *Grounded in a socio-ecological conceptual model*			
	Public health	**Community development**	**Education**	**Environmental quality**
Statements supporting a positive view (n=16 statements)	1.Students eat healthier when with farm to school. 2. Children's diets improve when they learn where their food comes from. 3. Farm to school programs are a good way to increase fruit and vegetable consumption among children. 4. Farm to school can help children foster a positive	1. Farm to school programs provide communities with local economic stimulus. 2. Farm to school programs create a link between schools and communities. 3. Hands-on activities can be included at farmers' markets to engage children and families to promote the benefits local foods. 4. Farm to school programs can diversify the food producer market and create local jobs in	1. Farm to school programs don't just feed students, it educates them. 2. Farm to school programs can teach children and adults how we used to eat in the past. 3. Children are more likely to eat vegetables when they grow them. 4. Farm to school programs can encourage children to learn about environmentally conscious attitudes and behaviors.	1. Farm to school programs have the potential to increase the proportion of available local foods at grocery stores. 2. Farm to school programs are environmentally sustainable and better for the environment than a traditional school foodservice program. 3. Children should be taught to grow food as part of their schooling. 4. Purchasing local foods is an environmentally

	relationship with healthy foods.	communities		friendly way to eat.

Statements supporting a neutral or ambivalent view (n=16 statements)	1. Incorporating a farm to school education into the classroom would not have a significant influence on improving students' nutrition knowledge 2. Farmers may benefit from farm to school programs, but they may not be profitable in the long term. 3. Farm to school programs do not positively impact students' health. 4. Farm to school programs address food system inequities by expanding all students' access to high quality, local fruits and vegetables.	1. There are few financial incentives for farmers to participate in farm to school programs in southwestern Virginia. 2. Farmers are not adequately compensated for their produce or meat when they sell to school foodservice customers. 3. There are enough local foods. 4. Farm to school programs do not have a community impact.	1. Farm to school programs do not enrich a child's education. 2. Farm to school topics are already covered in elementary schools in southwestern Virginia. 3. In many parts of the U.S. elementary school students do not receive agricultural education related to the current food and agriculture system. 4. Farm to school program success is not dependent on a school education curriculum.	1. Not enough schools participate in farm to school programs to see an environmental impact to reduce greenhouse gas emissions related to agriculture in southwestern Virginia. 2. Farm to school programs have limited impact on protecting the environment. 3. The potential of the local foods movement to produce a positive impact is unknown. 4. Children do not particularly care where their food comes from or how it is produced.

Statements supporting a negative view (n=16 statements)	1. Farm to school programs will reduce participation in the National School Lunch Program. 2. Federal funding for farm to school programs should be cut from the 2010 Healthy, Hunger Free Kids Act. 3. Farm to school programs do not influence fruit and vegetable preference and consumption. 4. Student health would not improve if we had a farm to school program in Montgomery County.	1. Farm to school is talked about as a success, but small local farmers are still struggling to make long lasting business contracts with schools. 2. Community engagement is an unrealistic outcome of a farm to school program. 3. Farm to school programs do not benefit communities. 4. Government legislation should not require schools to implement farm to school programs.	1. Students don't want more education on topics they don't care about. 2. Teachers have enough topics required to be covered by the state without a farm to school component. 3. Farm to school program success is not dependent on a curriculum. 4. Montgomery County Schools do not have adequate resources needed to properly create a farm to school curriculum.	1. Schools that want to participate in farm to school programs, still end up buying from big, national companies who pose as 'local' and 'organic' food producers. 2. Food producers will continue using chemicals despite the demands of farm to school programs in order to produce the biggest yield. 3. Most people do not care about the environmental impacts of their food choices. 4. Local foods are not more sustainable.

Appendix L

Activity 6: Post Q-Sort Questionnaire

Study ID_____ Date_____

Thank you for completing the card-sort activity. Please answer the questions below. There are no right or wrong answers. We want to learn about your point of view about the benefits, challenges, and opportunities of implementing farm to school programs in Montgomery County, Virginia.

Farm to School Questions

1. What did you think as you sorted the farm to school statements?

2. Explain why you sorted the farm to school statements in the "most agree" +4 pile.

3. Explain why you sorted the farm to school statements in the "most disagree" -4 pile.

4. Explain why you sorted the farm to school statements under the 0 column.

5. What future actions do you think need to be made to institutionalize and sustain a farm to school program in Montgomery County, Virginia?

6. What resources do you think are the most important to mobilize to expand farm to school programs into the southwestern region of Virginia?

Thank you for completing this activity. Please return this questionnaire to the researcher.

Appendix M

Correlation Matrix

Respondent	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14
P1	100	-30	63	70	71	77	55	70	61	63	28	48	1	61
P2	-30	100	-14	-25	-36	-23	-20	-39	-25	-30	-7	-21	3	-18
P3	63	-14	100	66	70	72	67	77	63	68	42	51	13	80
P4	70	-25	66	100	79	76	61	76	66	71	30	50	6	70
P5	71	-36	70	79	100	73	76	70	70	85	40	59	10	80
P6	77	-23	72	76	73	100	73	72	72	67	40	55	13	73
P7	55	-20	67	61	76	73	100	58	70	64	40	65	21	77
P8	70	-39	77	76	70	72	58	100	66	64	27	55	10	68
P9	61	-25	63	66	70	72	70	66	100	57	42	54	10	70
P10	63	-30	68	71	85	67	64	64	57	100	38	53	7	75
P11	28	-7	42	30	40	40	40	27	42	38	100	28	40	37
P12	48	-21	51	50	59	55	65	55	54	53	28	100	26	65
P13	1	3	13	6	10	13	21	10	10	7	40	26	100	23
P14	61	-18	80	70	80	73	77	68	70	75	37	65	23	100

Appendix N

Factor Solutions

2 Factor Solution: 14 participants and 60% variance

Num	Participant	FG	Factor 1	F1	Factor 2	F2
5	P5	F1-1	0.8466	☑	0.3486	☐
4	P4	F1-2	0.8359	☑	0.1888	☐
1	P1	F1-3	0.8121	☑	0.1188	☐
8	P8	F1-4	0.8027	☑	0.2647	☐
10	P10	F1-5	0.7657	☑	0.3064	☐
6	P6	F1-6	0.7638	☑	0.4104	☐
3	P3	F1-7	0.6946	☑	0.4318	☐
14	P14	F1-8	0.6808	☑	0.5774	☐
9	P9	F1-9	0.6765	☑	0.4173	☐
7	P7	F1-10	0.6009	☑	0.5972	☐
12	P12	F1-11	0.5127	☑	0.4738	☐
2	P2	F1-12	-0.4031	☑	0.1023	☐
13	P13	F2-1	-0.0828	☐	0.501	☑
11	P11	F2-2	0.2505	☐	0.4895	☑

3 Factor Solution: 14 participants and 62% variance

Num	Participant	FG	Factor 1	F1	Factor 2	F2	Factor 3	F3
1	P1	F1-1	0.645	☑	0.0724	☐	0.5219	☐
2	P2	F1-2	-0.448	☑	0.0296	☐	-0.1088	☐
13	P13	F2-1	-0.0548	☐	0.5569	☑	0.04	☐
11	P11	F2-2	0.1077	☐	0.4343	☑	0.3362	☐
14	P14	F3-1	0.1859	☐	0.2756	☐	0.8603	☑
5	P5	F3-2	0.4164	☐	0.1007	☐	0.8249	☑
10	P10	F3-3	0.323	☐	0.036	☐	0.7935	☑
7	P7	F3-4	0.2474	☐	0.4088	☐	0.7002	☑
3	P3	F3-5	0.3527	☐	0.2496	☐	0.696	☑
6	P6	F3-6	0.4823	☐	0.2853	☐	0.6654	☑
4	P4	F3-7	0.5505	☐	0.05	☐	0.6549	☑
8	P8	F3-8	0.5689	☐	0.1724	☐	0.6087	☑
9	P9	F3-9	0.4194	☐	0.3043	☐	0.6073	☑
12	P12	F3-10	0.2466	☐	0.3403	☐	0.5576	☑

4 Factor Solution: 11 participants and 64% variance

Num	Participant	FG	Factor 1	F1	Factor 2	F2	Factor 3	F3	Factor 4	F4
6	P6	F1-1	0.803	✔	0.2096		0.2648		0.194	
8	P8	F1-2	0.7588	✔	0.11		0.2451		0.3122	
3	P3	F1-3	0.7557	✔	0.1826		0.3251		0.0818	
4	P4	F1-4	0.7067	✔	0.0198		0.347		0.3465	
1	P1	F1-5	0.6971	✔	0.0205		0.199		0.421	
14	P14	F1-6	0.6721	✔	0.2771		0.5701		0.0158	
9	P9	F1-7	0.6532	✔	0.2739		0.2962		0.2256	
7	P7	F1-8	0.594		0.4136		0.4288		0.1064	
12	P12	F1-9	0.4593		0.3609		0.3567		0.1615	
13	P13	F2-1	-0.0004		0.5892	✔	0.0084		-0.0123	
11	P11	F2-2	0.2714		0.4538	✔	0.2		0.0666	
5	P5	F3-1	0.5435		0.1887		0.6613		0.3981	
10	P10	F3-2	0.5078		0.1108		0.6419	✔	0.2932	
2	P2	F4-1	-0.1394		-0.0181		-0.0867		-0.49	✔

Appendix O

Factor Arrays

Statement #	Statement	Factor 1	Factor 2
1	Children are more likely to eat vegetables when they grow them.	4	2
2	Farm to school can help children foster a positive relationship with healthy foods.	4	2
3	Teachers have enough topics required to be covered by the state without a farm to school component.	-1	-1
4	Children do not particularly care where their food comes from and how it is grown.	0	1
5	Farm to school programs are not related to public health.	-4	-3
6	Student health would not improve if we had a farm to school program in Montgomery County.	-2	0
7	Government legislation should not require schools to implement farm to school programs.	0	3
8	In many parts of the U.S. elementary school students do not receive agricultural education related to the current food and agriculture system.	1	4
9	Farmers may benefit from farm to school programs, but they may not be profitable in the long term.	0	-1
10	Incorporating a farm to school education into the classroom would not have a significant influence on improving students' nutrition knowledge.	-3	-3
11	Farm to school topics are already covered in elementary schools in southwestern Virginia.	-1	-4
12	Farm to school programs can encourage children to learn about environmentally conscious attitudes and behaviors.	3	2
13	Farm to school program success is not dependent on a curriculum.	0	0
14	Hands-on activities can be included at farmers' markets and community centers to engage children and families to promote the benefits local foods outside of school.	2	3
15	Schools that want to participate in farm to school programs, still end up buying from big, national companies who pose as 'local' and 'organic' food producers.	0	1

16	Not enough schools participate in farm to school programs to see an environmental impact to reduce greenhouse gas emissions related to agriculture in southwestern Virginia.	0	-1
17	Farm to school programs address food system inequities by expanding all students' access to high quality, local fruits and vegetables.	2	-3
18	Farm to school programs do not enrich a child's education.	-4	1
19	Farm to school programs are environmentally sustainable and better for the environment than a traditional school foodservice program.	2	-2
20	Farm to school programs do not positively impact students' health.	-3	-2
21	There are few financial incentives for farmers to participate in farm to school programs in southwestern Virginia.	0	4
22	Farmers are not adequately compensated for their produce or meat when they sell to school foodservice customers.	0	-2
23	There are enough local foods.	-1	0
24	Farm to school programs have the potential to increase the proportion of available local foods at grocery stores.	1	-1
25	Most people do not care about the environmental impacts of their food choices.	-1	1
26	Farm to school programs do not have a community impact.	-4	0
27	Purchasing local foods is an environmentally friendly way to eat.	2	1
28	Farm to school programs will reduce participation in the National School Lunch Program.	-1	-3
29	Farm to school programs are a good way to increase fruit and vegetable consumption among children.	3	-2
30	Children should be taught to grow food as part of their schooling.	3	4
31	The potential of the local foods movement to produce a positive impact is unknown.	-1	-1
32	Farm to school programs do not influence fruit and vegetable preference and consumption.	-2	2
33	Farm to school programs provide communities with local economic stimulus.	1	1

34	Local foods are not more sustainable.	-2	0
35	Farm to school is talked about as a success, but small local farmers are still struggling to make long lasting business contracts with schools.	1	0
36	Farm to school programs don't just feed students, it educates them.	4	0
37	Food producers will continue using chemicals despite the demands of farm to school programs in order to produce the biggest yield.	1	1
38	Montgomery County Schools do not have adequate resources needed to properly create a farm to school curriculum.	-2	2
39	Farm to school programs can diversify the food producer market and create local jobs in communities.	1	2
40	Students don't want more education on topics they don't care about.	-2	3
41	Children's diets improve when they learn where their food comes from and how it is produced.	2	-2
42	Community engagement is an unrealistic outcome of a farm to school program.	-2	-1
43	Federal funding for farm to school programs should be cut from the 2010 Healthy, Hunger Free Kids Act.	-3	-4
44	Farm to school programs have limited impact on protecting the environment.	-1	0
45	Farm to school programs do not benefit communities.	-3	-2
46	Students eat healthier when their school participates in farm to school programs.	2	-1
47	Farm to school programs can create a link between schools and communities.	3	3
48	Farm to school programs can teach children and adults how we used to eat in the past.	1	-4

Appendix P

Z-Scores for Factor 1

Statement Number	Statement	Z-score
36	Farm to school programs don't just feed students, it educates them.	1.722
2	Farm to school can help children foster a positive relationship with healthy foods.	1.579
1	Children are more likely to eat vegetables when they grow them.	1.473
29	Farm to school programs are a good way to increase fruit and vegetable consumption among children.	1.414
30	Children should be taught to grow food as part of their schooling.	1.35
47	Farm to school programs can create a link between schools and communities.	1.34
12	Farm to school programs can encourage children to learn about environmentally conscious attitudes and behaviors.	1.26
17	Farm to school programs address food system inequities by expanding all students' access to high quality, local fruits and vegetables.	1.184
19	Farm to school programs are environmentally sustainable and better for the environment than a traditional school foodservice program.	1.136
27	Purchasing local foods is an environmentally friendly way to eat.	1.116
41	Children's diets improve when they learn where their food comes from and how it is produced.	1.053
14	Hands-on activities can be included at farmers' markets and community centers to engage children and families to promote the benefits local foods outside of school.	0.977
46	Students eat healthier when their school participates in farm to school programs.	0.893
39	Farm to school programs can diversify the food producer market and create local jobs in communities.	0.836
8	In many parts of the U.S. elementary school students do not receive agricultural education related to the current food and agriculture system.	0.8
33	Farm to school programs provide communities with local economic stimulus.	0.739

48	Farm to school programs can teach children and adults how we used to eat in the past.	0.737
24	Farm to school programs have the potential to increase the proportion of available local foods at grocery stores.	0.425
37	Food producers will continue using chemicals despite the demands of farm to school programs in order to produce the biggest yield.	0.341
35	Farm to school is talked about as a success, but small local farmers are still struggling to make long lasting business contracts with schools.	0.285
16	Not enough schools participate in farm to school programs to see an environmental impact to reduce greenhouse gas emissions related to agriculture in southwestern Virginia.	0.154
15	Schools that want to participate in farm to school programs, still end up buying from big, national companies who pose as 'local' and 'organic' food producers.	0.117
21	There are few financial incentives for farmers to participate in farm to school programs in southwestern Virginia.	-0.008
22	Farmers are not adequately compensated for their produce or meat when they sell to school foodservice customers.	-0.069
9	Farmers may benefit from farm to school programs, but they may not be profitable in the long term.	-0.124
4	Children do not particularly care where their food comes from and how it is grown.	-0.163
7	Government legislation should not require schools to implement farm to school programs.	-0.331
13	Farm to school program success is not dependent on a curriculum.	-0.398
25	Most people do not care about the environmental impacts of their food choices.	-0.407
3	Teachers have enough topics required to be covered by the state without a farm to school component.	-0.567
11	Farm to school topics are already covered in elementary schools in southwestern Virginia.	-0.568
31	The potential of the local foods movement to produce a positive impact is unknown.	-0.61
44	Farm to school programs have limited impact on protecting the environment.	-0.615
28	Farm to school programs will reduce participation in the National School Lunch Program.	-0.627
23	There are enough local foods.	-0.675

40	Students don't want more education on topics they don't care about.	-0.784
34	Local foods are not more sustainable.	-0.9
38	Montgomery County Schools do not have adequate resources needed to properly create a farm to school curriculum.	-0.929
42	Community engagement is an unrealistic outcome of a farm to school program.	-1.112
6	Student health would not improve if we had a farm to school program in Montgomery County.	-1.145
32	Farm to school programs do not influence fruit and vegetable preference and consumption.	-1.213
20	Farm to school programs do not positively impact students' health.	-1.226
10	Incorporating a farm to school education into the classroom would not have a significant influence on improving students' nutrition knowledge.	-1.258
45	Farm to school programs do not benefit communities.	-1.302
43	Federal funding for farm to school programs should be cut from the 2010 Healthy, Hunger Free Kids Act.	-1.418
5	Farm to school programs are not related to public health.	-1.453
26	Farm to school programs do not have a community impact.	-1.46
18	Farm to school programs do not enrich a child's education.	-1.568

Appendix Q

Z-Scores for Factor 2

Statement Number	Statement	Z-score
8	In many parts of the U.S. elementary school students do not receive agricultural education related to the current food and agriculture system.	1.886
30	Children should be taught to grow food as part of their schooling.	1.631
21	There are few financial incentives for farmers to participate in farm to school programs in southwestern Virginia.	1.621
47	Farm to school programs can create a link between schools and communities.	1.61
7	Government legislation should not require schools to implement farm to school programs.	1.366
40	Students don't want more education on topics they don't care about.	1.366
14	Hands-on activities can be included at farmers' markets and community centers to engage children and families to promote the benefits local foods outside of school.	1.091
1	Children are more likely to eat vegetables when they grow them.	1.081
32	Farm to school programs do not influence fruit and vegetable preference and consumption.	1.07
2	Farm to school can help children foster a positive relationship with healthy foods.	1.06
38	Montgomery County Schools do not have adequate resources needed to properly create a farm to school curriculum.	0.826
12	Farm to school programs can encourage children to learn about environmentally conscious attitudes and behaviors.	0.816
39	Farm to school programs can diversify the food producer market and create local jobs in communities.	0.805
4	Children do not particularly care where their food comes from and how it is grown.	0.795
33	Farm to school programs provide communities with local economic stimulus.	0.795
15	Schools that want to participate in farm to school programs, still end up buying from big, national companies who pose as 'local' and 'organic' food producers.	0.551

25	Most people do not care about the environmental impacts of their food choices.	0.54
27	Purchasing local foods is an environmentally friendly way to eat.	0.53
37	Food producers will continue using chemicals despite the demands of farm to school programs in order to produce the biggest yield.	0.286
18	Farm to school programs do not enrich a child's education.	0.275
35	Farm to school is talked about as a success, but small local farmers are still struggling to make long lasting business contracts with schools.	0.265
13	Farm to school program success is not dependent on a curriculum.	0.021
44	Farm to school programs have limited impact on protecting the environment.	0
34	Local foods are not more sustainable.	-0.01
6	Student health would not improve if we had a farm to school program in Montgomery County.	-0.255
26	Farm to school programs do not have a community impact.	-0.265
36	Farm to school programs don't just feed students, it educates them.	-0.265
23	There are enough local foods.	-0.275
9	Farmers may benefit from farm to school programs, but they may not be profitable in the long term.	-0.296
16	Not enough schools participate in farm to school programs to see an environmental impact to reduce greenhouse gas emissions related to agriculture in southwestern Virginia.	-0.296
31	The potential of the local foods movement to produce a positive impact is unknown.	-0.52
42	Community engagement is an unrealistic outcome of a farm to school program.	-0.54
3	Teachers have enough topics required to be covered by the state without a farm to school component.	-0.551
46	Students eat healthier when their school participates in farm to school programs.	-0.551
24	Farm to school programs have the potential to increase the proportion of available local foods at grocery stores.	-0.785
19	Farm to school programs are environmentally sustainable and better for the environment than a traditional school foodservice program.	-0.805
29	Farm to school programs are a good way to increase fruit and vegetable consumption among children.	-0.805
45	Farm to school programs do not benefit communities.	-0.816

41	Children's diets improve when they learn where their food comes from and how it is produced.	-0.826
20	Farm to school programs do not positively impact students' health.	-1.07
22	Farmers are not adequately compensated for their produce or meat when they sell to school foodservice customers.	-1.081
28	Farm to school programs will reduce participation in the National School Lunch Program.	-1.081
10	Incorporating a farm to school education into the classroom would not have a significant influence on improving students' nutrition knowledge.	-1.335
5	Farm to school programs are not related to public health.	-1.345
17	Farm to school programs address food system inequities by expanding all students' access to high quality, local fruits and vegetables.	-1.366
48	Farm to school programs can teach children and adults how we used to eat in the past.	-1.366
43	Federal funding for farm to school programs should be cut from the 2010 Healthy, Hunger Free Kids Act.	-1.886
11	Farm to school topics are already covered in elementary schools in southwestern Virginia.	-1.896