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Nutrition and Food Safety Literacy Status Among Food Pantry Supervisors and Volunteers in South Carolina

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NUTRITION AND FOOD SAFETY LITERACY STATUS AMONG FOOD PANTRY SUPERVISORS AND VOLUNTEERS IN SOUTH CAROLINA

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ABSTRACT

According to the USDA, food insecurity or the inadequate access to a sufficient amount of nutritious food, affects over 12.3 percent of the U.S. population including more than 680,000 South Carolinians (USDA, 2017a). These individuals find some relief from food banks and food pantries that provide meals, groceries and services to individuals experiencing hunger, poverty, food insecurity and inadequate nutritional intake. Because food banks and pantries operate on limited budgets, they rely heavily on volunteers to perform numerous activities such as handling, sorting and distributing food. For this reason, food safety education of volunteers is critical in minimizing foodborne illness among food bank and pantry clients. Nutrition education is less prevalent among volunteers at food banks and pantries, but it is emerging as a successful intervention for improving client health and food insecurity. A study was conducted to determine the nutrition and food safety literacy among supervisors and volunteers working in food banks and pantries in South Carolina. A survey of food pantry supervisors was administered to characterize South Carolina food pantries and to identify gaps in nutrition and food safety knowledge. Survey information was then used to create a series of food safety and nutrition education modules for food pantry volunteers. Pre and post-test scores of volunteers completing the modules were used to improve modules and determine knowledge retention.

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CHAPTER ONE

LITERATURE REVIEW

INTRODUCTION

According to the United Nations Food and Agriculture Organization (FAO), it is estimated that of the 7.53 billion people there are 821 million who are classified undernourished, a measurement of hunger (FAO, 2018a). This equates to 10.9% of the world's population that are not able to acquire enough food to meet the minimum dietary requirements (FAO, 2008). Furthermore, the FAO states that these numbers have been on the rise for the past three years. FAO further defines undernourished individuals as "those whose dietary energy consumption is less than a pre-determined threshold" and "suffering from food deprivation" and defines hunger as "chronic undernourishment" (FAO, 2018a; FAO, 2019). In the United States, approximately 12.5% of the population (41 million individuals) suffers from hunger (USDA-ERS, 2017). In South Carolina (S.C.), hunger is around one percent higher than the national average, affecting over 687,880 individuals or 13.53% of the population (Feeding America, 2016). Alternatively, overnutrition, or "excessive food intake relative to dietary nutrient requirement" is also on the rise world-wide (FAO, 2015). Globally, it is estimated that 5.6% of children and 13.2% of adults suffer from obesity (FAO, 2018). Adult obesity in the United States affects about 38.9% of the population, or 93.3 million individuals (CDC, 2018b). Two in three adults, or 32.3% of the population in S.C. are affected by obesity (SC DHEC, 2018). In 2017, S.C. had the tenth highest obesity rate in the U.S. according to The State

of Obesity, founded by the Robert Wood Johnson Foundation (The State of Obesity, 2019).

While under-nutrition and over-nutrition statistics may seem unrelated, their commonality is that they are rooted in food insecurity. Households that experience food insecurity, or those which have "difficulty at some time during the year providing enough food for all their members due to a lack of resources" and may be "without reliable access to a sufficient quantity of affordable, nutritious food" (USDA-ERS, 2016). Food insecurity, an overarching term for all those without food is defined by the FAO (2018) as adequate quantities of safe, nutritious, quality food, obtained in socially acceptable ways and continuously available. In undernourished populations, food supply may be scarce, and less food is consumed overall for these populations, affecting generations through "inadequate infant and child feeding" and "insufficient intake of calories, protein, vitamins and minerals" leading to "child stunting and wasting" (FAO, 2018). In overnourished populations, "inexpensive, high-calorie, low-nutrition foods" are consumed often to attempt to alleviate stress, anxiety or depression and, paired with disordered eating behaviors, "metabolic adaptations to food deprivation" leads to overweight and obese populations (FAO, 2018). Inexpensive, high-calorie, low-nutrition foods are often consumed for immediate satiety and as a coping mechanism when money is not available for healthier alternatives.

Under-nutrition and over-nutrition are categorized into a broad term, malnutrition, which is characterized by "deficiencies, excesses or imbalances in the consumption of macro- and/or micro-nutrients" (FAO, 2018). Malnutrition is the cause of a multitude of

diseases, such as anemia and obesity, and can be associated with those who experience food insecurity, often seen in populations around the world with low resources (FAO, 2018). The terms 'hunger,' 'food insecurity' and 'malnutrition' are often used interchangeably, and while related, have distinct meanings. "Hunger may be a possible consequence of food insecurity that can be useful in characterizing severity of food insecurity" (NRC, 2006). Food insecurity is an overarching cause for hunger and malnutrition which often translates to health problems, especially obesity, in low socioeconomic status populations.

Several programs have been developed to elevate the problem of hunger, malnutrition and food insecurity. These government programs include, but are not limited to the Supplemental Nutrition Assistance Program (SNAP), Women, Infants and Children Program (WIC), The Emergency Food Assistance Program (TEFAP) and The Commodity Supplemental Food Program (CSFP), and all were created to provide food and non-food items to those who meet certain criteria identifying needs. On the other hand, private food assistance programs in the form of food banks, food pantries and other emergency food providers have developed from charitable individuals and organizations that saw a need to change the food insecurity status in their area. All of these programs have a common goal of hunger relief but are using different approaches.

Food pantries and food banks represent one of the solutions to food insecurity, malnutrition and hunger by providing mainly food but often non-food items and services to those in need. In S.C., there are four food banks that serve over 800 food pantries. Similar to other food pantries and food banks around the U.S., these food pantries and

food banks struggle to maintain trained volunteers and provide standardized training involving nutrition as well as food safety components. Thus, the objectives of the current study were to: 1) determine nutrition and food safety educational needs of food pantry volunteers in South Carolina; 2) identify commonalities in policies, procedures and practices among food pantries in South Carolina; 3) identify commonalities in characteristics of food pantry supervisors and volunteers in South Carolina; and 4) develop and deliver a training curriculum for food pantry volunteers in South Carolina.

LITERATURE REVIEW

In the United States, it is estimated that 11.8% of the population experiences food insecurity at some point during the year, affecting all races, ethnicities and age groups (Coleman-Jensen et al., 2018; Mousa and Freeland-Graves, 2018). In S.C., an estimated 11.7% of individuals experience food insecurity (Coleman-Jensen et al., 2018). To understand these statistics and how they relate to one another, definitions from previous research, governing bodies and regulatory agencies must be identified. Previous research does not have consistent definitions of food security, food insecurity, hunger and malnutrition making comparisons between studies difficult (Holden, 2005; NRC, 2006; FAO, 2008; USDA-ERS, 2016; AND, 2017; Coleman-Jensen et al., 2018; USDA-ERS, 2018c; USDA-ERS, 2018b; Johns Hopkins Medicine, 2019). Tables 2.7, 2.8, 2.9, 2.10 and 2.11 define these terms according to various organizations, individuals and governing agencies and these tables are available in the Appendix.

For the purposes of this thesis, the following definitions for food security, food insecurity, hunger and malnutrition will be used. *Food security* is defined as access to enough nutritious, safe, affordable food, procured in socially acceptable ways without coping mechanisms, to maintain a healthy and active lifestyle (FAO, 2008; Coleman-Jensen et al., 2018; USDA-ERS, 2018a; Feeding America, 2018a). *Food insecurity* refers to the lack of food security (Feeding America, 2018b; Feeding America, 2018c). *Hunger* is defined as "a potential consequence of food insecurity that, because of prolonged, involuntary lack of food, results in discomfort, illness, weakness, or pain that goes beyond the usual uneasy sensation" (USDA-ERS, 2018a). Malnutrition is defined as deficiencies, excesses or imbalances of micronutrients or macronutrients that over time may lead to chronic illness or acute disease (FAO, 2008; AND, 2017). Under- and over-nutrition are defined using the Johns Hopkins Medicine (2019) definitions. The definition of poverty is based on the United States Census definition, and is dependent on the year that the study was conducted (United States Census, 2019). All other terms are defined as discussed in the thesis.

Food Insecurity, Poverty, Hunger, Malnutrition and Obesity

In the United States, very low food security as defined by the USDA-ERS (2018a) affects an estimated 4.9% of Americans. Most very low food insecure individuals reported "having worried that their food would run out before they got money to buy more," "reported that the food they bought did not last, and they did not have money to get more" and "reported that they could not afford to eat balanced meals" (USDA-ERS, 2018a). Using a nationwide survey, Feeding America (2018a) stated that "higher

unemployment and poverty rates are associated with higher rates of food insecurity", suggesting that poverty has a direct effect on food insecurity (Feeding America, 2018b). Seventy-nine percent of the counties with high food insecurity rates in the United States were in rural areas and 89% of these counties in the South region (Feeding America, 2018a). Rural communities in the South region of the U.S. have high food insecurity and poverty rates, including S.C.. S.C. has the 9th highest poverty rate in the U.S. as defined by the United States Census Bureau, with an estimated 15.4% of the state population living in poverty, and S.C. is tied with Florida for the 18th highest food insecurity rate in the U.S., with an estimated 13.9% of the Florida population living in poverty (United States Census Bureau, 2018). The top five highest food insecurity rate counties in S.C. (Allendale, Williamsburg, Bamberg, Orangeburg and Lee) are rural (Feeding America, 2018d; The Office of Rural Health Policy, 2016). Allendale County, S.C. has the highest estimated rate of food insecurity of any county in the state (25.6% of the population) followed by Williamsburg County (23.2%), Bamberg County (23.1%), Lee County (22.3%) and Orangeburg County (22.3%) (Feeding America, 2018d). Furthermore, Allendale County has an estimated poverty rate at 36.7% of the population (Feeding America, 2018d; United States Census Bureau, 2018). Rural communities are not the only risk factor for food insecurity. Past research has identified associations between other demographics and food insecurity, such as being female, having a health condition, being unemployed, smoking, lacking nutrition education or ineligibility to receive Social Security Insurance (SSI) (Mousa and Freeland-Graves, 2019).

The terms ‘food insecurity’, ‘hunger’ and ‘malnutrition’ are often used interchangeably, and while related, have distinct meanings. “Hunger may be a possible consequence of food insecurity that can be useful in characterizing severity of food insecurity” and “all hungry people are food insecure, but not all food insecure people are hungry” (NRC, 2006; FAO, 2008). Individuals who are impoverished, or making below the poverty threshold, and food insecure do not have enough funds or access to nutritious food to maintain a healthy, active lifestyle, leading to hunger and use of coping mechanisms to stave off hunger (Wood et al., 2008; Hoisington et al., 2002). Worldwide hunger is rampant, affecting an estimated 821 million individuals around the world, including an estimated 41 million individuals in the United States and over 687,880 individuals in S.C. (Feeding America, 2016; USDA-ERS, 2017). Hunger decreases quality of life and coping mechanisms are used to alleviate some of the problems with hunger. Coping mechanisms include but are not limited to choosing less expensive high calorie foods to maintain satiety, eating less than normal, receiving federal or private food assistance or stealing or scavenging food (Wood et al., 2008). To ward off hunger, food insecure populations buy food that is more affordable, energy dense and readily available to promote immediate satiety and save money (Tanumihardjo et al., 2007). The nutritional makeup of this energy dense food is high in calories, carbohydrates and fat (Tanumihardjo et al., 2007). Past research shows those experiencing food insecurity have diets that are “lower in the proportion of energy derived from fruits and vegetables, meat and dairy products, and higher in the proportion of energy derived from cereals, sweets, and added fats” and overall had less intake of “Vitamins A and B-6, calcium, magnesium,

and zinc" (Tanumihardjo et al., 2007; Hanson and Connor, 2014; Rarahbakhsh, 2017; Wright et al., 2018). Increased fat content in diet could be explained by the need to maintain fullness and prevent hunger when money for food is not available (Dietz, 1995).

Over time, malnutrition may occur due to the nutritional quality or quantity of food that is consumed, whether clinical symptoms or health problems are present (Tanumihardjo et al., 2007). Malnutrition manifests itself in many forms, such as undernutrition, resulting in stunting, wasting and underweight individuals, or overnutrition, resulting in overweight and obesity (WHO, 2018). These individuals may have excesses, deficiencies or imbalances of micronutrients, macronutrients or both micro-nutrients and macro-nutrients (WHO, 2018). Micronutrients such as vitamins and minerals are building blocks for hormones, enzymes and other substances in the body that allow proper bodily function and development (WHO, 2018). Deficiencies and overconsumption of these nutrients can cause a multitude of diseases such as anemia, blindness, toxicities, and in extreme cases, death (WHO, 2018). High intake of macronutrients such as fat, carbohydrate and protein can also cause health problems. These nutrients contain energy in the form of calories, and while certain amounts are essential for life, overnutrition and undernutrition can cause major changes in body weight status (WHO, 2018). Overnutrition results in an excess of energy, the calories consumed are more than the calories expended, resulting in weight gain (WHO, 2018). Undernutrition, which is drastically less common, results in a deficit of energy, the calories consumed are less than the calories expended, resulting in weight loss (WHO, 2018). Malnutrition leaves individuals vulnerable to foodborne illnesses, due to decreased

function in their immune systems (Chaifetz and Chapman, 2015). Persistent malnutrition can eventually lead to the development of "diet-related noncommunicable diseases (NCDs)" including obesity, diabetes, cancer, heart attack, stroke and other conditions worldwide (Tanumihardjo et al., 2007; WHO, 2018). Consequently, food insecurity is associated with "increased rates of diabetes, hypertension and hyperlipidemia, as well as poorer physical and mental health, and quality of life" (Robaina and Martin, 2013; Wright et al., 2018). Chronic diseases, such as the aforementioned, affect an estimated 6 in 10 American adults, with 4 in 10 having two or more chronic diseases (CDC, 2016). Obesity is one of the most prominent chronic diseases of food insecurity in the United States and has been linked to food insecure populations (Pan et al., 2012). Nationally, obesity affects an estimated 93.3 million U.S. adults, or 39.8% of the population (CDC, 2019a). Childhood obesity affects an estimated 13.7 million children and adolescents aged 2-19 (CDC, 2019b). Childhood illnesses such as obesity and food insecure classifications often indicate incidence of the most severe cases because children are historically the last to be affected by household problems. Obesity is a major health concern in S.C.. It is estimated that one in three adults and one in four children in S.C. suffer from obesity, and 67.2% of adults are either overweight or obese (CDC, 2019a). Notably, Body Mass Index (BMI) was used to determine these statistics. BMI is a "readily obtained metric" and is often used to determine weight status, but current studies have determined BMI is misleading in determining body fat mass, morbidity and mortality rates and metabolic health (Nuttall, 2015). Overweight and obesity are specifically common in those who receive food assistance, whether from a food pantry,

soup kitchen or other emergency food organizations (Robaina and Martin, 2013; Mousa and Freeland-Graves, 2018).

Cycle of Food Insecurity

Duration of food insecurity is often dependent on a multitude of socioeconomic factors. Transitory food insecurity may result when there are "short-term shocks and fluctuations in food availability and food access, including year-to-year variations in domestic food production, food prices and household incomes" (FAO, 2008). Transitory food insecurity often can turn into chronic, or long-term, persistent food insecurity, which often results from "extended periods of poverty, lack of assets and adequate access to productive or financial resources" (FAO, 2008).

The cycle of food insecurity has a variety of consequences and is intertwined in a web of socioeconomic factors centered on increased stress and poverty, as shown in Figure A.1. For example, those in poverty may struggle paying bills on time, often having to choose between buying food or paying the electricity bill. These individuals are living paycheck to paycheck if they have a job and often, consequences of paying bills, such as the power getting cut off, their car impounded or getting evicted from their home, have larger immediate impacts than cutting the food budget. After paying necessary bills, there will be a little left to pay for food for the individual and whomever they may support. In one S.C. food bank service area, it was estimated that 78% of households had to choose between paying for food or paying for utilities, 75% of households chose between "food and reliable transportation," 56% of households chose between paying for food or housing and 29% of households chose between food and education costs (Harvest Hope

Food Bank, 2019a). With a decreased food budget, individuals often use coping mechanisms to stretch their food dollars, including buying less-expensive, unhealthy options, buying food that will fill them up for a longer period of time, eating less than normal and selling personal items (Feeding America, 2019a). As already mentioned, these coping mechanisms lead to a less nutritionally adequate diet than those who are food secure, often consisting of calorie dense staple foods that are high in sodium, simple carbohydrates and fat (Tanumihardjo et al., 2007; Hanson and Connor, 2014; Rarahbakhsh, 2017; Wright et al., 2018). This nutritionally inadequate diet over time may exacerbate pre-existing health conditions or cause the development of a diet-related non-communicable disease. Due to lack of financial and other resources, costly health maintenance may also be neglected to focus more money and time towards work, bills or other required payments. In the same S.C. food bank service area as mentioned before, an estimated 71% of households had to choose between paying for medical expenses and medication or paying for food (Harvest Hope Food Bank, 2019a). Disease maintenance is often costly, emotionally, physically and financially, whether it be the actual doctor visit, paying for medications, eating specific foods, adjusting to new medications, increased stress, finding resources to educate yourself about the disease or finding time for physical activity. Chronic diseases, which often have acute serious medical symptoms, attribute to increased cost for admittance to emergency care centers in hospitals or free-standing ambulatory care clinics. Decreased health status leads to decreased employability, as a result of increased absences from work and decreased work performance. Missed work or loss of employment causes a decrease in household income and worsening of competing

demands, between medical bills and other costs such as housing, utilities, education, transportation and food. This completes the circle, causing the individual to decrease their food budget, use coping strategies to obtain food and leading them in a cycle of increasing food insecurity (Feeding America, 2019a). Interventions by government food assistance programs and hunger-relief organizations created to break this cycle will be explained in the next section.

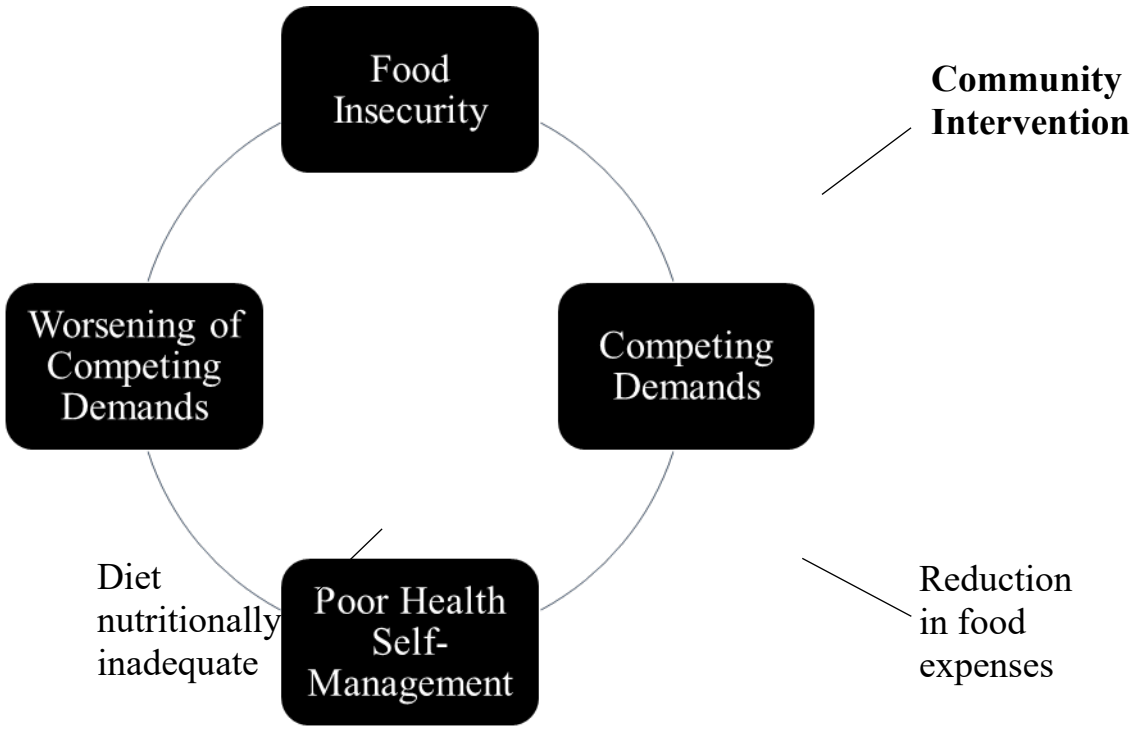

Figure A.1. Cycle of Food Insecurity

Government Food Assistance and Nutrition Programs (FANPs)

Overall

Federal government food assistance and nutrition programs (FANPs) administered by the Food and Nutrition Service (FNS) and the U.S. Department of Agriculture (USDA) provide food, benefits or education to those in need to ensure U.S.

"citizens neither go hunger nor suffer the consequences of inadequate dietary intake" (Fox et al., 2004). There are 14 FANPs in total, offering "food, the means to purchase food, and/or nutrition education" to citizens of the United States (U.S. Department of Commerce, 2019; Fox et al., 2004). While they all provide these benefits, they vary in target population, size of program, money allotted for program and the delivery of benefits (Fox et al., 2004). Eligibility differs between programs but is largely based on income, household size and household composition determining percent of the Federal poverty guideline. The Federal poverty guideline is fluid, changing every year and adjusting to the economy and inflation using the Consumer Price Index (U. S. Census Bureau, 2019a; U. S. Census Bureau, 2019b). For 2018, the weighted average poverty threshold for a family of four was an annual income of $25,707 (U.S. Department of Commerce, 2019). Income eligibility for FANPs starts at 130% of the poverty threshold, meaning any family of 4 making $33,419 or less in a year is eligible (U.S. Department of Commerce, 2019). Other basic eligibility requirements include being a U.S. citizen or "eligible, lawfully-present non-citizen" and satisfying other eligibility requirements such as income and resource limits (USDA-FNS, 2019a). The United States Department of Agriculture Food and Nutrition Service strategic plan for 2000-2005 was based on increasing nutrition for children and low-income populations, goals including "improving food security, promoting healthy food choices among FANP participants, and improving the quality of meals, food packages, commodities, and other program benefits" (Fox et al., 2004). The 14 active FANPs include the following: National School Lunch Program (NSLP), Special Milk Program (SMP), Commodity Supplemental Food Program (CSFP),

Summer Food Service Program (SFSP), Supplemental Nutrition Assistance Programs (SNAP), Special Supplemental Nutrition Program for Women, Infants, Children (WIC), School Breakfast Program (SBP), Fresh Fruit and Vegetable Program (FFVP), Food Distribution Program on Indian Reservations (FDPIR), Child and Adult Food Care Program (CACFP), The Emergency Food Assistance Program (TEFAP), Farmers' Market Nutrition Program (FMNP) and Senior Farmers' Market Nutrition Program (SFMNP) (Fox et al., 2004). Other programs offered by the Food and Nutrition Service have been discontinued or modified into new programs, such as the Food Stamp Program (FSP), Nutrition Services Incentive Program (NSIP), Team Nutrition Initiative (TN) and Nutrition Assistance Program in Puerto Rico, American Samoa, and the Northern Marianas (NAP) (Fox et al., 2004). FANPs can be divided into four categories based on their benefit-delivery: child nutrition programs; women, infant and child nutrition programs; supplemental nutrition assistance programs and food distribution programs (USDA, 2018). Table 1.1 gives an overview of these programs and Appendix B provides additional information.

Table 1.1. Government Food and Nutrition Programs (FANPs)

FANP	Population Served	Benefits Delivered	Eligibility Requirements
National School Lunch Program (NSLP)	School-aged children	Free and reduced-price nutritionally-adequate meals and snacks	≤ 130% of Federal poverty guideline
Special Milk Program (SMP)	School-aged children	Half-pints of milk	≤ 130% of Federal poverty guideline
Commodity Supplemental Food Program (CSFP)	Low-income infants, children up to 6 years old, pregnant and	Referrals to government social services and health care, nutrition	≤ 130% of Federal poverty guideline for adults (60+ years old)

	postpartum women and adults (60+ years old)	education and foods (commodity)	≤ 130% of Federal poverty guideline for infants, children and women
Summer Food Service Program (SFSP)	Low-income school-aged children	Free snacks and meals meeting nutrition specifics	Approved feeding site
Supplemental Nutrition Assistance Program (SNAP)	Low-income households	Benefits used to purchase food from local retailers	≤ 130% of Federal poverty guideline
Special Supplemental Nutrition Program for Women, Infants, Children (WIC)	Infants; children ages 1-4; low-income women who are pregnant, postpartum or breastfeeding	After-school snacks and nutrition specific lunches	≤ 185% of Federal poverty guideline
School Breakfast Program (SBP)	School-aged children	Nutrition-specific breakfasts	≤ 130% of Federal poverty guideline
Fresh Fruit and Vegetable Program (FFVP)	School-aged children	Fresh fruit and vegetable snacks	
Food Distribution Program on Indian Reservations (FDPIR)	Low-income households on reservations and low-income American Indians	Foods (commodity)	≤ 130% of Federal poverty guideline
Child and Adult Food Care Program (CACFP)	Children and adults at registered after-school programs, homeless shelters and adult/child day care facilities	Meals and snacks	Attendance at approved feeding site
The Emergency Food Assistance Program (TEFAP)	Low-income individuals and households	Food procured through hunger relief organizations (food banks, food pantries, etc.)	State dependent
WIC Farmers' Market Nutrition Program (FMNP)	WIC-eligible individuals	Benefits to purchase fresh produce	≤ 185% of Federal poverty guideline
Senior Farmers' Market Nutrition	Adults (60+ years old)	Benefits to purchase fresh produce	≤ 185% of Federal poverty guideline

Program (SFMNP)			

Fox et al., 2015

Challenges of Government FANPs and Barriers to Usage

For food insecure populations, federal government food assistance and nutrition programs continue to fail to meet needs due to multiple limiting factors. As outlined in Table 1.1, "about 58% of food-insecure households reported receiving assistance from one or more of the three largest [FANPs]" including SNAP, National School Lunch Program and WIC (Coleman-Jensen et al., 2018). Of the U.S. food insecure population, 53% of individuals are below 130% of the poverty threshold and are covered by SNAP, Child Nutrition and WIC benefits and an additional 20% of individuals fall in 130-185% of the poverty threshold and are covered only by Child Nutrition and WIC benefits (Feeding America, 2018a). This leaves 27% of individuals who are at or above 185% of the poverty threshold and are not eligible for any government assistance programs but still suffer from the effects of food insecurity (Feeding America, 2018a). In S.C., 55% of food insecure individuals are below the SNAP threshold, 15% were "between 130 and 185% poverty" and 30% are above 185% threshold for other nutrition programs (Feeding America, 2018j). That means that 30% of food insecure South Carolinians rely on other means to obtain food, such as private and non-profit emergency food assistance programs (Feeding America, 2018j). Those who meet the poverty threshold guidelines may still face problems gaining eligibility, including citizenship and criminal background (Mousa and Freeland-Graves, 2018).

Possible reasons for lower rates of participation of those eligible for assistance have been theorized (Biggerstaff et al., 2002; Fox et al., 2004). In some areas, retail

establishments that accept benefits may not be in large supply and smaller establishments, especially those in rural areas, may not be able to afford to wait for redemption reimbursement. Large grocery stores may be 10 or more miles away and if an individual does not have a car or money to buy gas, the establishment is inaccessible. Regardless of government FANP eligibility, resources available to individuals vary according to socioeconomic status, lack of food attributed to a "lack of resources; inability to commute to a store that contained good-quality foods or the type needed; absence of a kitchen and/or defective cooking/storage facilities (a stove/refrigerator); or experiencing a health issue" (Mousa and Freeland-Graves, 2018). Language barriers and accessibility to programs may also be an issue (Mousa and Freeland-Graves, 2018).

Of those who participated in government FANPs, challenges in the benefits led some participants to remain food insecure, whether due to participant education on using resources, participant resources or program limitations (Fox, et al., 2004). One study by the American Dietetic Association (currently Academy of Nutrition and Dietetics) stated that government FANPs are "important in helping participants meet nutrient needs, but to be most effective they must include nutrition education and poverty eradication so that appropriate choices are made to promote optimal health" (Tanumihardjo, 2007). When looking at food nutrient quality, food secure populations have better nutritional intake than food insecure populations and food insecure populations receiving SNAP benefits (Mousa and Freeland-Graves, 2018). If foods with lower nutritional value are bought with benefits because they taste good or are convenient, participants may not improve their food insecurity status because more nutrients are not being consumed (Fox et al.,

2004). With no other measures in place, such as nutrition education that is easy to understand, piques interest and is accessible for participants, those who are food insecure may remain food insecure. Some participants found that benefits ran out before the end of the month, leading them to use emergency food assistance or coping mechanisms (Biggerstaff et al., 2002). As mentioned previously, health-related outcomes such as hypertension, diabetes, depression, anemia and asthma have been associated with food insecure populations (Jacknowitz et al., 2019). Symptoms from these health conditions can alter an individual's ability to buy groceries, work and do day-to-day activities, which would affect an individual's ability to use government FANP benefits (Jacknowitz et al., 2019). With all these limitations, government FANPs often simply do not provide enough food or benefits to last throughout the month (Feeding America, 2011). A study by Feeding America determined that an estimated 41% of food pantry clients "reported receiving SNAP benefits" while going to the food pantry and 58% of those clients were "recurrent or frequent" visitors meaning they had at least visited the food pantry "most months" for 6 to 9 months (Feeding America, 2011). For these reasons, individuals that participate in government FANP benefits or those who are not eligible for benefits often turn to private or non-profit hunger relief organizations.

Table 1.2. Comparison of Participation in FANPs and Hunger Relief Organizations

	Participation in government food and nutrition assistance programs (FANPs)	Participation in Supplemental Nutrition Assistance Program (SNAP)	Below 130% poverty	Between 130 and 185% poverty	Above 185% poverty
Percentage of **food pantry users** in Feeding America		41%[1]			

network					
Percentage of **food insecure households in U.S.**	58%[5]		53%[3]	20%[3]	27%[3]
Percentage of **food insecure households in S.C.**			55%[4]	15%[4]	30%[4]
Percentage of **individuals eligible for SNAP in S.C.**		80%[2]			

[1] Feeding America, 2011
[2] USDA, 2019a
[3] Feeding America, 2018b
[4] Feeding America, 2018j
[5] Coleman-Jensen et al., 2018

Private and Non-Profit Hunger Relief Organizations

Overall

Emergency food assistance programs in the form of food banks, food pantries, soup kitchens and other emergency food providers (hunger relief) have arisen due to charitable individuals and organizations that saw a need to change the hunger status in their area over the past 200 years (Biggerstaff et al., 2002; Cleland, 2018). These programs were established as temporary, emergency food assistance programs during times of crisis, war and economic hardship and would open and close according to need (Biggerstaff et al., 2002). "A combination of government policy reforms and political economic trends contributed to the rising numbers of individuals relying on private food assistance" and they are continuing to rise (Bazerghi et al., 2016; Bacon and Baker, 2017). With increased food insecure individuals, the need for private and nonprofit hunger relief organizations has increased. Generally, larger food and hunger relief organizations provide food and money to their member food banks, which they provide to

their member food pantries, who then distribute food and provide services to those who frequent the food pantry (clients). In this thesis, a food bank will be considered large, warehouse type redistributors of rescued, bought and surplus food (Biggerstaff et al., 2002; Bazerghi et al., 2016). All food banks in this study are members of the Feeding America network. In this thesis, food pantries will be considered smaller charitable organizations that provide their clients with grocery items and services (Bazerghi et al., 2016). While soup kitchens, or charities that provide prepared food to those in need, are a large part of hunger relief systems, this thesis will not focus on their part in hunger relief. The food, flow of money and organization between food banks and food pantries will be discussed in greater detail later in this section. These food assistance programs receive food and monetary support from individuals, organizations and food rescue programs. Food assistance programs are supplemented by federal programs such as TEFAP and CSFP (Fox et al., 2004). TEFAP specifically supplies the food bank or emergency food provider with USDA commodities directly to be distributed to clients (Fox et al., 2004). CSFP provides low-income seniors with a monthly package of USDA commodities that is sometimes provided to emergency food providers to be distributed to clients (Fox et al., 2004). A study by Feeding America found that 54% of sampled food pantry clients had visited the food pantry at least once per month for 6 months out of the past year, with 36% of clients visiting the pantry every month in the past year (Feeding America, 2011). This suggests that the emergency hunger relief has become a staple for maintaining food in the households of those who visit food pantries and food insecurity possibly persists in

this population. These organizations have mostly started as emergency services that have become integrated into the infrastructure of our communities as permanent solutions.

Feeding America

Feeding America is the largest hunger relief organization in the U.S., with 200 food banks serving 600 pantries and programs, and feeding approximately 46 million people over 4 billion meals (Feeding America, 2018e and 2018f). While Feeding America has significant impact on hunger and food insecurity in the U.S. today, it started as one food bank in Phoenix, Arizona in 1967 (Riches, 2002; Feeding America, 2018e). John Van Hengel established St. Mary's Food Bank with a goal to use surplus food that could no longer be sold in stores to feed the impoverished (Riches, 2002; Feeding America, 2018e). After a successful year of distributing 275,000 pounds of food to those in need in Phoenix, food banks were established in many different cities across the nation (Feeding America, 2018e). In 1979, Van Hengel created an organization to unify food banks across the U.S., calling it America's Second Harvest – The Nation's Food Bank Network (Biggerstaff et al., 2002; Feeding America, 2018e). America's Second Harvest grew dramatically from the early 1980s and continues to grow today (Biggerstaff et al., 2002). In 2008, America's Second Harvest changed its name to Feeding America, hoping to "elevate hunger-relief programs for greater visibility and involvement" and align their goals with fighting hunger, increasing public engagement and continuing to bring about change in peoples' lives (Feeding America, 2008; Feeding America, 2018e). Today, Feeding America fights hunger through research, public policy and continuing to provide

food and support to hunger-relief charities across the country (Feeding America, 2018f; Feeding America, 2018g).

Feeding America is a network of member food banks, who fulfill food safety and operation requirements to become members. Feeding America serves as a nationwide advocate for food banks, creating partnerships with large corporations who strive to give back to the community, offering food and money donations, volunteers and rescue foods and non-food items to food banks to distribute (Feeding America, 2018h). Feeding America supplies these food banks with $94 million in grants ("flexible funding", "disaster relief", "food sourcing", "community programs" and "capacity building" grants) (Feeding America, 2018h). Of the 4.3 billion meals served by Feeding America partner agencies, 1.4 billion meals came from retail and grocery companies (donations), 718 million meals from manufacturing companies (donations), 687 million meals from farm fresh produce (donations), 619 million meals from federal commodities provided by government programs, 540 million meals from food purchased from manufacturers and distributors, 229 million meals from the SNAP assistance programs and 63 million meals from "restaurants, hotels and convenience stores" (donations) (Feeding America, 2018h). The research that Feeding America has conducted, including *Map the Meal Gap*, *Hunger in America 2014* and research on hunger and health, policy, benefits, poverty, unemployment and senior, teen and Latino hunger have extensively shaped communities and policy across the nation (Feeding America, 2018g). This research focuses on the causes of food insecurity, specifically populations vulnerable to food insecurity and

barriers that stop them from effectively using resources, their education needs and ways to help them (Feeding America, 2018i).

Feeding America funds several programs that have member-locations across the country (Feeding America, 2018j). Their "Mobile Pantry Program" reaches individuals with the highest need, using food banks that have mobile food pantries to go into "underserved or hard-to-reach areas" and "distributing food [directly] in pre-packed boxes or at farmers' market-style settings" (Feeding America, 2018j). Disaster Food Assistance works with food banks in disaster areas to send extra food and supplies to areas in need (Feeding America, 2018j). Feeding America also partners with government food assistance and nutrition programs such as the Summer Food Service Program and SNAP to provide additional support and make the programs more accessible (Feeding America, 2018j). The School Pantry Program and Kids Café provide snacks, meals and grocery items to children in need (Feeding America, 2018j). Lastly, the Senior Grocery Program helps seniors who are struggling with medical expenses and health problems feed themselves with easy to make meals at home (Feeding America, 2018j).

Organization and Flow of Food Banks and Food Panties

Although some pantries are independent of larger organizations, many food pantries are members of food banks, who collect and distribute food to member food pantries. Food pantries are not limited to food from food banks and often receive donations in the form of food and money, work with local farmers and retailers and fundraise to be able to maintain their facilities. Food banks are often members of a larger network of food banks, in this case Feeding America. Feeding America receives

donations in the form of food or money, from individuals and companies, retail and manufacturing companies, fresh produce from farmers, federal commodities, restaurants, hotels and convenience stores (Feeding America, 2018h). Feeding America also purchases food to fill gaps where donations are not filling the needs and provides food and resources to member food banks, who collect and distribute to food pantries, soup kitchens and other hunger relief organizations for a nominal price, "typically cents to the pound of product" (Wilson, 2016; Feeding America, 2018h). Agencies then provide food and non-food items to their clients, or those who partake in the agencies' benefits, for free.

Food banks are often large warehouses containing pallets of food delivered by trucks or picked up by the food bank using their vehicles. Sometimes, larger food banks will have several different distribution warehouses to reach across their service area and make the commute easier for agencies. While food banks have freezer and refrigerator spaces, this space is limited due to the cost of upkeep and is often reserved for food that will spoil without temperature control. For most food banks, everything in the food bank is inventoried by weight, including the food that is "sold" to the agencies. Agencies often will send "shoppers," or volunteers working at the agency, to shop at the food bank for items that the agency needs. Food banks are open to shoppers from once a week to once a month, depending on the needs of the agencies and the capacity of the food bank. The selected products are then loaded into the volunteer's personal car or the agency's car. In some cases, the food bank will use their vehicle to transport food to agencies, often when there is surplus of a specific food or time sensitive food.

Agencies, or food bank member food pantries that distribute grocery items to those in need, vary widely in organization, distribution method, size, operating hours, available resources, equipment, manpower and level of community support. Agencies may be religiously affiliated, connected to a church, free-standing or connected to an organization, family or community. They will often have a supervisor, that may be paid or unpaid and/or a board of directors that lead the agency and help facilitate community connections. Most, if not all of those who work at the agency are volunteers and range from children to older adults. Agencies may be a food pantry and/or a soup kitchen or other form of hunger relief, serving grocery items to hot meals and offering services such as general job training to free shower facilities to grocery store tours. Facility size and operating hours are often based on the amount of financial, food and manpower donations that the agency receives. Agencies could have a large space, allowing for more storage and clients or be small, only being able to serve a few families a month. Although agencies are required to have a reliable, operational refrigerator and freezer according to Feeding America requirements, the size of these units may vary depending on the agency's budget. Operating hours could vary from every day to once a month and could offer everything from pre-made boxes filled with food to food items displayed on shelves, allowing clients to "shop" in their agency with a grocery store setup (Martin et al., 2013; Wilson, 2016).

The food distribution method is especially important to the health and wellbeing of the client and exists on a spectrum of client choice (Wilson, 2016). On one end of the spectrum, the traditional setup with food boxes are created based on a template

and adjusted according to family size, providing the clients with a wide variety of foods that they may or may not like (Wilson, 2016). On the other end of the spectrum is the full client-choice pantries, where the layout of the agency is like a grocery store and clients can pick out food that their family will eat with limited guidelines (Wilson, 2016). Every alternative between traditional setup to full client-choice agencies exists and there are advantages and disadvantages to each. The distribution method chosen for the agency is often based on time, money and human resources available to the individual agency. Traditional pantry distribution methods allow food boxes to be made ahead of time using a template with categories and volunteers pick items from each category without knowledge of what the client may prefer. This method, while ideally creating a nutritionally adequate wide variety of food, may lead to food waste or include foods that their client is not able to prepare (Wilson, 2016; Mousa and Freeland-Graves, 2018). Hybrid distribution may include a pre-made box that clients can pick up with core items, then the client can choose additional food items. Limited client-choice distribution allows clients to choose specific numbers of items from specific categories (Wilson, 2016). Hybrid and limited client-choice distribution have the most advantages for the agency and client, allowing the client more choice on what foods are chosen as well as keeping the pantry from running out of high-demand items too fast. Full client-choice distribution is less common, allowing clients to choose foods with limited constraints on how much of a specific group they can choose (Wilson, 2016). While still constrained by weight or some other measurement of total food, clients in client-choice distributions may feel

more dignified and this distribution method "may permit a more efficient distribution of [products]" (Martin et al., 2013; Wilson, 2016).

All distribution styles of pantry face challenges of maintaining enough variety of nutritious food, working with inconsistent donations and maintaining an adequate quantity of food for their client population (Wilson, 2016). Donations are inconsistent and may be items that agencies find hard to get rid of, such as dried beans or eggplant. Agencies rarely turn down donations of food and whether that be a truckload of sugary pastry or fresh apples, they strive to maintain a supply of healthy, nutritious and filling food for their clients.

Feeding America Food Bank and Food Pantry Organization

Food bank and food pantry organization varies widely but the core structure demonstrated in Figure A.2 is common in many Feeding America food banks and food pantries. Food and monetary donations enter the Feeding America network at a nationwide level, then travels through food banks and food pantries to reach those in need. Food Bank Supervisors oversee operations at the food bank, including daily operations, pantry relations and program management. Food Pantry Supervisors serve only the food pantry and serve as a liaison between the food bank and food pantry, organizing volunteers to pick up food from the food bank, assigning volunteers jobs within the food pantry and overseeing food pantry daily operations.

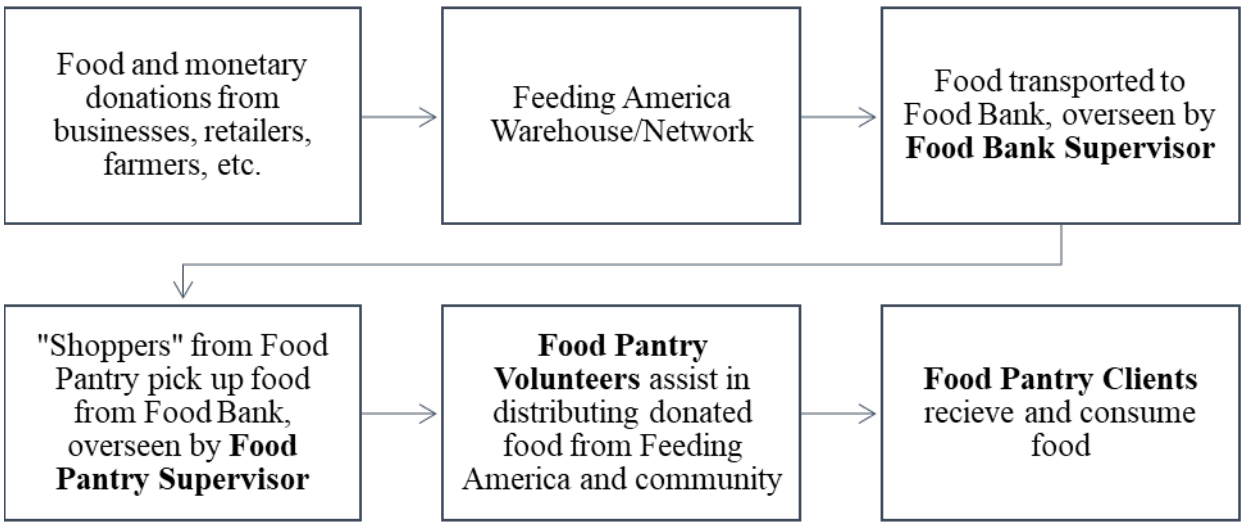

Figure A.2. Organizational Flow of Feeding America Network (Feeding America, 2018g)

Typical Member Food Pantry Characteristics

Most member food pantries were traditional setup, with food pantry clients picking up food boxes assembled ahead of time, client-choice, with food pantry clients choosing their own foods, or a hybrid of traditional and client-choice. Often hybrid food pantry setups included pre-made shelf-stable food boxes with client-choice fresh produce options to complete the box. Volunteers from food pantries shop, or buy food for free or a nominal price, at food banks up to two times a month to supplement donations and increase variability of products. In addition to shopping at food banks, food pantry volunteers sort donations, fill food box orders, pick up donations, check food dates, stock shelves and manage other volunteers. All establishments that handle food are legally required to distribute safe food and food bank donations fall under a set of regulations, Bill Emerson Good Samaritan Donation Act of 1996, requiring volunteer training. All food banks use *ServSafe Food Handler* or *ServSafe Food Handler for Food Banking* for

annual/biennial food safety training of volunteers and Food Pantry Supervisors, requiring one trained individual at each food pantry. Food banks required thermometers in all refrigerators and freezers and did not allow home-canned food, repackaged or opened packages. Nutrition interventions included disease-conscious food boxes, such as boxes with reduced sugar for those with diabetes, nutrition handouts with puzzles or games to increase interest, grocery store tours and programs to increase the procurement or consumption of healthier options.

Feeding America Food Banks in South Carolina

In S.C., Feeding America has four member food banks, Harvest Hope Food Bank, Second Harvest Food Bank of Metrolina, Lowcountry Food Bank and Golden Harvest Food Bank. Each of these food banks receives support from Feeding America and maintains certain requirements to renew membership every year. These food banks are highly involved with their respective communities and the programs that Feeding America stands for, each having different goals and initiatives that are unique to their communities.

Harvest Hope Food Bank serves 20 counties in the Upstate, Pee Dee and Midlands regions of S.C., partnering with 439 member agencies in these counties and has served over 2 million individuals over the past year (Harvest Hope Food Bank, 2019a). In the counties in which Harvest Hope Food Bank serves, the food insecurity rate is estimated at 14.9% of the population (Harvest Hope Food Bank, 2019b). Harvest Hope Food Bank has several programs focused on child, senior and veteran hunger as well as their mobile pantry operation. Their three warehouses, Midlands, Pee Dee and Upstate

locations serve over 28 million pounds of food a year (Harvest Hope Food Bank, 2019c; Harvest Hope Food Bank, 2019d; Harvest Hope Food Bank, 2019e). Additionally, the Midlands location has an emergency food pantry in downtown Columbia, S.C., for immediate hunger relief in high trafficked area (Harvest Hope Food Bank, 2019c).

Second Harvest Food Bank of Metrolina (Second Harvest) serves 19 counties, 14 counties in North Carolina, and 5 counties in northern S.C. (Second Harvest Food Bank of Metrolina, 2018a). They partner with over 700 member agencies and serve 54 million pounds of food and other non-food household items, 17.5 million pounds being "fresh produce, meat and dairy" (Second Harvest Food Bank of Metrolina, 2018a). Approximately 75% of the food they distribute is from donations, 11% is purchased by donations and fundraising and 14% from government commodities (Second Harvest Food Bank of Metrolina, 2018a). Second Harvest supports child hunger relief through their Kids Café, Backpack program, School-Based Mobile Pantry and many School Based Programs, providing meals, snacks and easy to prepare grocery items to school-aged children (Second Harvest Food Bank of Metrolina, 2018b). Their Second Helping and Fresh Produce Markets supply "supplemental boxes of nutritional foods to homebound elderly" and fresh produce markets for seniors in local senior programs, respectively (Second Harvest Food Bank of Metrolina, 2018c). Second Harvest also offers a mobile pantry, community food rescue program and disaster relief (Second Harvest Food Bank of Metrolina, 2018b; Second Harvest Food Bank of Metrolina, 2018d). Of the service area that Second Harvest serves, approximately 18.3% of the population lives in poverty

and is served from their locations in Hickory and Dallas, N.C. and Spartanburg, S.C. (Second Harvest Food Bank of Metrolina, 2018a).

Lowcountry Food Bank (Lowcountry) serves 10 counties in the coastal region of S.C., partnering with 300 member agencies and distributing over 31 million pounds of food and non-food items to over 200,000 individuals in need in 2018 (Lowcountry Food Bank, 2019a). The food bank has several programs benefiting children, such as School Pantry, BackPack Buddies, Kids Café and Summer Meals programs (Lowcountry Food Bank, 2019b). Lowcountry partners with local agencies, such as Meals on Wheels to provide food to seniors and distribute food for the Commodity Supplemental Food Program (CSFP) (Lowcountry Food Bank, 2019b). Partnering with SNAP as a SNAP Education Implementing Agency, Lowcountry offers cooking courses, recipes, grocery store tours, nutrition education for partner agencies and outreach events in their full-scale portable kitchen (the Charlie Cart), allowing clients to taste test and learn how to prepare recipes (Lowcountry Food Bank, 2019d). They have created a mobile pantry specifically for fresh produce that travels their service area, distributing produce grown from their Growing Food Locally program, which "invests in small-enterprise local farms and sources surplus produce" (Lowcountry Food Bank, 2019e). Like the other food banks, they participate in The Emergency Food Assistance Program (TEFAP) and the Commodity Supplemental Food Program (CSFP) as well as SNAP-Ed, which helps to "improve nutrition and prevent or reduce diet-related chronic disease and obesity among SNAP recipients" (Lowcountry Food Bank, 2019f). Lowcountry has their own commercial full-scale kitchen (Zucker Family Production Kitchen) that works with the

Kids Café, Senior Meals and Food Works program, which partners with local high schools to provide culinary training (Lowcountry Food Bank, 2019g).

Golden Harvest Food Bank (Golden Harvest) serves 19 counties in Georgia and 11 counties in the southwestern border of S.C. and Georgia, partnering with 260 member agencies (Golden Harvest Food Bank, 2019b). They have distributed over 15 million pounds of food, fed over 906,000 people and served over 13 million meals in 2018 (Golden Harvest Food Bank, 2019a). Golden Harvest gives relief to child hunger through the Backpack Program and Pantry Packs, providing easy-to-prepare grocery items for the weekend for school-aged children and relief to senior hunger through the senior food box program (Golden Harvest Food Bank, 2019c; Golden Harvest Food Bank, 2019d). The food bank also has a mobile food pantry and a soup kitchen (Master's Table) in downtown Augusta (Golden Harvest Food Bank, 2019e; Golden Harvest Food Bank, 2019f). Recently, the food bank has started a Healthy Plate Program that provides families with healthy foods and nutrition education to improve the health and wellbeing of those in need (Golden Harvest Food Bank, 2019g). They have a warehouse in Augusta and distribution centers in Aiken and the Upstate (Golden Harvest Food Bank, 2019h).

Nutritional Adequacy of Food Pantry (Agency) Food

Studies suggest that up to 25% of household food consumed by food pantry users may be supplied by the food pantries (Wright et al., 2018). Food pantries rely heavily on donations and food from food banks, which means they rely on the nutritional quality of this food. It has already been determined that food insecurity influences the nutritional quality of the food consumed and consequently the health of the individual,

but hunger relief organizations such as food pantries are often more concerned with the amount of food provided than its nutritional quality (Mousa and Freeland-Graves, 2018; Wright et al., 2018; Feeding America, 2019a; Feeding America, 2019b). Additionally, donors do not usually think about the nutritional value of the foods they are donating and "tended to rely on the food shelf operators to request nutritious foods or to buy the foods that people needed" (Verpy et al., 2003). Research has shown that food pantries distribute food that is high in salt, fat and simple carbohydrates (Rowland et al., 2018). Research is inconclusive on the nutritional adequacy of food consumed by individuals who frequent food pantries and the effect it has on their health. A study by the American Dietetic Association (Academy of Nutrition and Dietetics) stated that food in pantries were "of low nutrient density for calcium, vitamin A and vitamin C" as well as low in fruits, legumes and dairy products and "of high nutritional quality for protein, fiber, iron, and folate" (Adobundu et al., 2004; Farahbakhsh et al., 2017; Schneider, Anthony and Walker, 2017). This study also found that the food boxes contained the most servings of "fats, oils and sweets group" followed by the "bread, cereal, rice, and pasta group", an equivalent to last an individual 7 days as opposed to the amount of fruit and dairy in the food boxes, which would only last about 3 days for an individual (Adobundu et al., 2004). One study indicated that food boxes created by food pantries may not meet recommended nutritional requirements and may be low in whole grains, dairy, fruits and fish (Nanney et al., 2016; Wright et al., 2018). A study of food pantry clients identified "no significant increase in overall dietary quality" before and after visiting a food pantry, meaning the nutritional quality of the foods chosen or supplied at the food pantry had

equal than what they had previously been eating (Wright et al., 2018). In a different study looking at the impact of supplemental food from pantry donations found that "the addition of food donations to the base diet resulted in consumption of a total diet that was rich in fruits, total vegetables and grains, dairy and protein foods" and the overall quality of the diet was improved after food donations were added (Mousa and Freeland-Graves, 2018). Food pantries have limited space and even more limited refrigerated and frozen storage, which can be a problem when attempting to extend the shelf-life of fresh fruits and vegetables (Mousa and Freeland-Graves, 2018). This barrier alone can decrease the nutritional content of the food distributed significantly if enough canned fruits and vegetables are not available. Client-choice pantries may also have the capacity for a wider variety of nutritional quality (Remley et al., 2013; Bryan et al., 2019). Overall, the nutritional quality of the food distributed through food pantries varied but was heavily dependent on donations.

Challenges with Private/Non-profit Hunger Relief Organizations

Challenges for food pantries stem from their access and efficient use of resources. As mentioned earlier, food pantries rely mostly on donations, food and monetary, and are run by volunteers willing to share their time and skills to help others. Food donations are often not meeting nutrition recommendations, lack variety, quantity and quality and are inconsistent (Verpy et al., 2003; Bazerghi et al., 2016; Mousa and Freeland-Graves, 2018). A review of food pantries by Bazerghi et al. (2016) revealed that "(1) The number of food [pantry] clients is increasing; (2) donations are not increasing with demand, or donations received are not appropriate; (3) food [pantry] staffs are not

highly enough trained around nutrition to provide advice and education to clients" (Bazerghi et al., 2016).

Sourcing healthy, nutritionally adequate food is often a challenge for food pantries and maintaining a sufficient quantity of healthy food is even more challenging (Bazerghi et al., 2016). Even when given money to buy food for the food pantry, healthier options have a higher cost and food pantries are drawn to getting more less-nutritional food as opposed to less high-nutritional food, especially when refrigerated and frozen storage that extends the shelf life of fresh foods is limited (Bazerghi et al., 2016). Perceived needs and wants of clients have identified the need for increased food choices in food pantries, including age-, health- and culturally-appropriate food (Verpy et al., 2003). One study stated that 40% of food pantry users "had enough to eat but it was not always the type of food that they wanted to consume" (Mousa and Freeland-Graves, 2018). One of the overarching complaints about food at the food pantry is associated with the variety of food and the amount of food not being enough to maintain satiety for their entire families, which could be due to inconsistent donations (Verpy et al., 2003). Clients voiced concerns about pantries not supplying kid-friendly or senior-friendly foods and lacking foods that are appropriate for those with diabetes or other chronic illness (Mousa and Freeland-Graves, 2018).

Food safety is also a concern within food pantries (Bazerghi et al., 2016). Some clients voiced concerns about receiving food items out-of-date, moldy or infested with bugs (Bazerghi et al., 2016). As mentioned before, malnourished and food insecure populations have an increased risk of foodborne illness (Chaifetz and Chapman, 2015).

With vulnerable populations, organizations that distribute food to these populations must be even more careful when complying with food safety practices (Chaifetz and Chapman, 2015). Donated food has an even higher risk for foodborne illness because it travels through so many hands, each increasing risk of contamination (Finch and Daniel, 2005). "Consumers in general have inadequate knowledge about the prevention of foodborne illness" and feel that because they've been cooking their whole lives and not gotten sick, they don't need to bother with food safety practices (Finch and Daniel, 2005). This translates to volunteers at the food pantry and their food safety practices. The minimal training volunteers receive during orientation-type trainings at the beginning of their time volunteering often is lacking in safe food handling topics including "temperature control, hygiene, and sanitizing" (Finch and Daniel, 2005).

Making changes in a food pantry environment may have its own set of challenges. Due to the volunteer status and high turnover rate of most of those who work at the food pantry, some initiatives may be hard to implement (Evans and Clarke, 2010). Every volunteer has different motivations for volunteering, different skill levels and interests (Clary and Snyder, 1999). If these skills and interests do not align, it can be hard to motivate volunteers to do certain tasks, as well as see the importance of performing these tasks (Clary and Snyder, 1999). Information on how long volunteers serve varies according to location, motivations for volunteering, age and other factors (Clary and Snyder, 1999; Garner and Garner, 2001; Jamison, 2003; Smith et al., 2014). High volunteer turnover has been stated in multiple studies, but no solid evidence has been reported (Mathieu, 2002; Finch and Daniel, 2005; Garner and Garner, 2011; Chaifetz and

Chapman, 2015). Volunteer retention is important to food pantries because it reduces time spent training and positively "affects continuity, client welfare, and agency morale" (Jamison, 2003; Garner and Garner, 2011). Turnover may be caused by dissatisfaction in the volunteer experience for various reasons, whether voluntary or nonvoluntary (Jamison, 2003). While nonvoluntary reasons, such as moving, health reasons or other responsibilities cannot be prevented, voluntary reasons related to insufficient work experiences may be prevented (Jamison, 2003). Previous research determined that 40% of volunteers "reported dissatisfaction with how they were managed" (Jamison, 2003). S.C. Food Bank Supervisors also reported volunteer management as a training need among food pantry volunteers. Interventions to alleviate nutrition, food safety and health-related problems have been implemented into food banks and food pantries and will be discussed in the next section.

Nutrition, Food Safety and Health Related Interventions in Hunger-Relief Programs

Food pantries have attempted to increase the health and wellness of clients through many different programs and interventions, attempting to target the risk factors for food insecurity, poverty and hunger and reduce the risk of foodborne illness (Finch and Daniel, 2005; Remley et al., 2013; Chaifetz and Chapman, 2015; Martin et al., 2018). These interventions have mostly been in the form of nutrition ranking systems, food pantry interventions, nutrition nudges, nutrition education, food safety education and increased ancillary services offered.

Nutrition Ranking Systems

Nutrition ranking programs generally group or rank foods based on their nutritional value to make healthier choices more pronounced and easier to understand. Feeding America's Foods to Encourage (F2E) system groups specific healthy foods into four different categories (Fruits & Vegetables, Grains, Protein and Dairy), identifying the healthiest options within each category with nutrition criteria (Feeding America, 2015; Martin et al., 2018). This program is not always applicable to food pantry environments because the healthiest options may not be available and no tier below alternatives were given (Martin et al., 2018). Three-tiered (stoplight) systems such as "Go, Slow, Whoa" system by the National Heart, Lung, and Blood Institute groups food based on nutrient-density, or the highest amount of nutrients per calorie (National Heart, Lung, and Blood Institute, 2013; Martin et al., 2018). The "Go" group includes the healthiest foods that be eaten most often, followed by the "Slow" group that includes foods higher in fat, calories and added sugar that should be consumed less often and "Whoa" foods that should only be eaten occasionally and are very high in calories, fat and added sugar (National Heart, Lung, and Blood Institute, 2013). Advantages of the stoplight-based systems are the use of colors and pictures, reducing the language and literacy barrier that may exist in food pantry settings (Martin et al., 2018). The Choose Healthy Options Program (CHOP) is also a stoplight-based system created for a food bank in Pittsburgh, Pennsylvania (1 – "choose frequently", 2 – "choose occasionally", 3 – "choose rarely"), using a computer algorithm and focusing on the values of specific nutrients and food groups (Martin et al., 2018). This method is typically inapplicable in food pantries, where a computer may or

may not be available for food pantry use but could be implemented in a food bank (Martin et al., 2018). The Supporting Wellness at Pantries (SWAP) is another stoplight-based system using 11 food categories and ranking foods Green, Yellow or Red with specific nutrient limits based on one serving (saturated fat, sodium and sugar). The SWAP program also added food categories that were typically seen in food pantries ("meals/combo foods", "snacks/dessert", "beverages" and "condiments") (Martin et al., 2018). A "Wellness Tracker System" was also created by a food bank in Washington, D.C. (Capital Area Food Bank) ranking foods based on fiber, sugar and salt content and defining qualifying foods as "Wellness Foods" (Martin et al., 2018). The food bank then provided incentives to member agencies dependent on the amount of wellness foods they ordered (Martin et al., 2018). The USDA's Healthy Eating Index-2010 has been used "to monitor the nutritional quality of [hunger relief organization] food" and was analyzed in the hunger relief system through the Healthy Feedback On Ordering Decisions (FOOD) (Nanney et al., 2016; Caspi et al., 2018). Foods are given a score of 0-100 based on twelve nutrients, "higher scores indicating better alignment with recommendations" (Caspi et al., 2018). The Food Assortment Scoring Tool (FAST) further developed the HEI-2010, revised food categories and "adjusted the index parameter estimation procedures" (Caspi et al., 2018). FAST added new categories and sub-categories, such as separating protein into "vegetable protein," lean protein and "highly processed meats" and verified that the new index correlated well with the HEI-2010 Hunger Relief Nutrition Index (HRNI) (Caspi et al., 2018). Other nutrition ranking systems have been identified in Feeding America food banks that are similar to the above and focused on

measuring specific nutrients or other variables like availability, client preference and economic worth (Handforth et al., 2013).

Food Bank Nutrition Interventions

As mentioned in an earlier section, Feeding America and all the food banks of S.C. have specific programs targeting increased nutritional intake of food insecure clients. A study of nutrition-based initiatives at Feeding America Food Banks determined that nutrition profiling, nutrition policies and fresh produce are the main ways that food banks incorporate nutrition into their facilities (Handforth et al., 2013). Nutrition profiling was similar to the previously mentioned nutrition ranking systems. Nutrition policies included restricting the foods that can be distributed and eliminating foods like candy and soda that provide no nutritional value (Handforth et al., 2013). Increasing fresh produce and perishable foods have always been important and a vital part of nutrition initiatives and food banks have started creating approaches to solve barriers to storage and client interest (Handforth et al., 2013). Food banks in S.C. offer cooking classes, taste tests, grocery store tours, programs to increase healthy foods, referrals to government food and financial assistance and increased fresh produce initiatives.

An example of a food bank nutrition intervention was Raising the Bar on Nutrition, a program of the Rhode Island Community Food Bank (Flynn et al., 2013). Raising the Bar on Nutrition was a food bank cooking class intervention encouraging plant-based recipes to improve food security, body weight and food purchases (Flynn et al., 2013). Plant-based cooking classes were offered on-site at the food bank for six weeks and when asked, participants reported using the recipes about 3 times a week

(Flynn et al., 2013). Fruit and vegetable intake increased, grocery receipts reported less "meat, carbonated beverages, desserts, snacks and total groceries" purchased, food insecurity scores decreased and body mass index (BMI) decreased (Flynn et al., 2013). These interventions at a food bank level can be translated to food pantry interventions.

Food Pantry Nutrition Interventions

Pantry interventions, independent of pantry distribution setup, may involve but are not limited to nutrition nudges, cooking classes, taste tests, trained educators, nutrition education, improved food variety, selection or nutrition or improved food safety practices. Feeding America has outlined four groups of nutrition interventions and ways to incorporate them into member pantries ("nudges", "point of service", "train the trainer" and "workshops") (Feeding America, 2019c). Nudges "provide subtle nutrition information/education; require little or no cost; and assist in distributing more healthy foods" (Feeding America, 2019c). These subtle environmental changes can be anything from education materials in a waiting line to signage to food placement within the pantry, embedded in psychological theories of consumerism (Wilson, 2016; Feeding America, 2019c). A study of a New York pantry used nudges like placement and packaging of specific products to increase uptake (Wilson et al., 2016). When protein bars were put in the first of the line of desserts, the protein bars were more likely to be chosen and even more likely when the product remained in its original box (Wilson et al., 2016). A type of nudge, the CAN approach (convenient, attractive, normal), has been theorized to not only change client behavior but overcome some of the barriers common in food pantries (Wilson, 2016). Food insecure populations are vulnerable to certain aspects of client-

choice pantry setups and regularly use coping mechanisms, including "compensatory consumption" to "regain a sense of power" over their lives in poverty (Wilson, 2016). This "compensatory consumption may lower self-regulation and add to cognitive load" which may lead to "greater consumption of a less healthy snack" or unhealthy decisions when choosing foods (Wilson, 2016). While client-choice pantry models are ideal, some guidance and limitations are still necessary in maintaining successful pantry operations (Wilson, 2016). A review of nudges by Wilson (2016) investigated pantry structure, bundling healthy meal options, dedicated healthy aisles, age-appropriate foods and highlighting healthy choices with environmental changes (Wilson, 2016). Nudges are one of the most implemented interventions in food pantries due to the ease of implementation and cost-effectiveness.

Point of service interventions include "cooking demonstrations, taste testing or walking a food distribution line with education materials while simultaneously providing pre-determined talking points via a volunteer or staff member" (Feeding America, 2019d). Train the Trainer interventions use community health workers who extensively understand the problems of the communities in which they serve, creating an intermediary between health and social services (Feeding America, 2019e). This community health worker can "facilitate access to services and improve the quality and cultural competence of service delivery" and increase "health knowledge and self-sufficiency through a range of activity such as outreach, community education, informal counseling, social support and advocacy" (Feeding America, 2019e). Cooperative Extension staff from local land-grant universities and food bank staff can serve as

community workers that can bridge gaps in education (Feeding America, 2019e). An intervention in traditional Arkansas food pantries used education materials to target donors and clients, attempting to increase donor knowledge on nutritious foods that would support client health and client use of these healthy foods with distribution of recipes geared specifically towards Hispanic and Pacific Islander clients (Long et al., 2019). While educating donors and clients, the pantries distributed donor food lists, increased their distribution of fresh fruits and vegetables and "improved access to healthy food" (Long et al., 2019). Across the pantries leading the intervention, ideas were shared about how to source healthier food options and the most effective ways to educate donors and clients (Long et al., 2019). The intervention resulted in "a significant increase in the mean amount of [fresh fruits and vegetables] FFVs distributed per person per household," reduced sodium intake and benefits to all clients from increased nutritional quality of food (Long et al., 2019).

Client-choice pantries have several advantages to affecting food insecurity rates. Client-choice pantry interventions are often more successful than traditional pantry interventions because of pantry flexibility and client autonomy. Research shows that client-choice pantries "impart a sense of dignity and allow clients to exercise personal and cultural food preferences" and reduce food waste due to clients not knowing how to prepare the food, not preferring the food or not needing the food (Martin et al., 2013; Remley et al., 2013). Client-choice pantries have the capacity to promote nutrition in more ways than traditional pantries, due to client interaction with the food, set-up of the pantry and the reasoning for choices that clients make. Several interventions, similar to

the following, target client-choice food pantries and use nutrition and food safety education to improve the behaviors of their clients (Feeding America, 2019f).

Freshplace, a client-choice food pantry intervention, focused on "addressing the underlying causes of poverty (e.g. underemployment, unstable housing, and mental health issues)" while fighting hunger (Martin et al., 2013). The "members" or clients could choose their own foods from a variety of mostly fresh and perishable foods and visit the pantry twice a month (Martin et al., 2013). The members met with a project manager to track "personal goals for becoming food secure and self-sufficient, as well as expectations and potential barriers to achieving them," using motivational interviewing to achieve success (Martin et al., 2013). Additionally, the Freshplace model offered services and referrals related to nutrition education and government programs (Martin et al., 2013). "After baseline, those participating in Freshplace were less than half as likely to experience very low food security compared to the control group" and average fruit and vegetable intake increased significantly among Freshplace members (Martin et al., 2013). The Rainbow of Colors Choice Pantry Model worked to promote nutrition, provide services and provide a variety of food choices starting with a shopping card that guides clients "to make informed dietary choices" and integrate nutrition knowledge in the client-choice pantry (Remley et al., 2013). Using MyPlate food groups and color-coded shelves, clients learned about food groups and received nutrition education from volunteer shopping assistants (Remley et al., 2013). These volunteer shopping assistants were Ohio State University Cooperative Extension nutrition trained staff who "offered tips on healthy choices and promoted the idea of using a variety of food groups when

preparing meals", driving home nutrition education (Remley et al., 2013). Members were allowed a certain number of food group items based on their family size (Remley et al., 2013). Ancillary services, such as SNAP-Ed cooking demonstrations and workshops with unpopular food items from the pantry, SNAP outreach, referrals to social service agencies, assistance on utilities, student financial aid, tax credits or help enrolling in government food assistance (SNAP, WIC, USDA child nutrition program) were offered (Remley et al., 2013). Although there is not extensive research using the Rainbow of Colors Choice Pantry Model, Cooperative Extension programs have noted its flexibility to work with most food pantries inventory capacity (Remley et al., 2016). Another intervention, The Word of Life food pantry, focused on "encouraging variety, increased consumption of vegetables and fruits, and safe food handling" teaching on-site nutrition and food safety education through cooking demonstrations using food from the pantry (Miyamoto et al., 2006). During the demonstration and while clients were waiting to get into the pantry, Cooperative Extension educators asked questions about proper handwashing, fruit and vegetable preferences, rinsing the outsides of canned goods and whether clients would try recipes at home (Miyamoto et al., 2006). Results showed that 50% of clients made the recipes at home, 20% enjoyed the food they made and 60% of children said they would eat vegetables when prepared with meals (Miyamoto et al., 2006). As for food safety concerns, handwashing was reported as increased when consuming and preparing food by the adult clients (Miyamoto et al. 2006). Authors specifically stated considerations for delivering education: "ability/flexibility to create a fast and easy main dish using available ingredients", "development trust and rapport with

agency staff and clients" and "cultural appropriateness and language barriers" (Miyamoto et al., 2006).

Community wide interventions, using schools, community educators, recreation centers, medical professionals, health clinics, government agencies, corporations and companies to affect change have also been studied (Knoblock-Hahn et al., 2016; Slutka et al., 2018). In a review by An et al. (2019), food pantry interventions implemented new food packaging, chronic disease-related interventions, nutrition education, cooking classes, recipe and food-use tips and food stamp nutrition education (An et al., 2019). Positive outcomes including "improved nutrition and health literacy, food security, cooking skills, healthy food choices and intake, diabetes management and access to community resources" were measured (An et al., 2019).

Food Safety Interventions

As mentioned earlier, those who are food insecure have a higher risk for foodborne illnesses and "more than 90 percent of reported cases of foodborne illness in the United States are related to poor food-handling practices involving improper holding temperature and poor personal hygiene" (Finch and Daniel, 2005; Kwon et al., 2013). Because volunteers working in hunger-relief organizations often do not have prior food safety training, "ongoing education programs to maintain food safety" must be implemented (Finch and Daniel, 2005). Prior research exploring food safety standard operating procedures (SOPs) in food pantries found that SOPs vary widely between organizations and even though there are some safe practices being performed, there is room for improvement "in terms of food safety training and supporting resources"

(Chaifetz and Chapman, 2015). Feeding America has partnered with *ServSafe* and member food banks to create a *ServSafe Food Handler Guide for Food Banking*, covering how food becomes contaminated and unsafe, workers' roles as food handlers, transportation of food, time and temperature control, evaluation of the safety of food, safe food handling, cleaning and sanitizing and pest control (Golden Harvest, 2017). Increasing fresh fruits and vegetables in food banks and food pantries has also raised concerns, due to their link with foodborne illnesses (Chaifetz and Chapman, 2015). Often, food banks themselves will have specialized food safety training applicable to their agencies and include it in the agency manuals, on their website or in the form of an online presentation or handout (Golden Harvest Food Bank, 2018; Lowcountry Food Bank, 2019h).

Other food safety training and education resources, such as Fight BAC! (2019) and Safe Aid (1996) have created applicable food safety information for use in food pantries and food banks (Willis, 1996; Fight BAC!, 2019). *Safe Aid*, created by Vickie Willis, was created as a food safety training for food banks, "to provide material which will equip food handlers and managers at food banks to safely receive, handle, and distribute food products" (Willis, 1996). The food safety resource included chapters on foodborne illnesses in food banks, setting up a safe food pantry environment and facility, risk management, safe food handling and safely repackaging bulk foods (Willis, 1996). Each chapter in *Safe Aid* was supplemented with summary sheets, posters and quizzes to create a training program with multiple exposures to the material (Willis, 1996).

In a study measuring the effectiveness of food safety education in a hunger-relief setting, 62% of volunteer workers had no prior food safety training and it was found that the implemented training significantly improved the knowledge of the volunteers (Finch and Daniel, 2005). Similar research in hunger-relief settings agreed with the lack of training of volunteers prior to working at the organization, averaging around one-third of workers (Kwon et al., 2013; Smith et al., 2014). While significant improvements were observed in knowledge of food safety, a study measuring behavior showed no significant changes in behavior for hygiene, temperature and cross contamination topics (Smith et al., 2014; Finch and Daniel, 2005). Concerns for non-compliance with proper food safety practices is that people know the correct practice but are "not thinking about it all the time" (40%), that they "had no knowledge" (40%) or the 20% of respondents "chose to ignore safe practices" (Smith et al., 2014). The training by Finch and Daniel (2005) consisted of "basic causes and symptoms of foodborne illness, evaluation of the safety of food products, safe food-handling practices, and prevention strategies" (Finch and Daniel, 2005). Other programs had similar topics with some using *ServSafe* materials (Smith et al., 2014). Pre-tests among studies identified concerns in the "lack of familiarity with the use of thermometers to determine safe food-holding temperatures…handwashing practices and egg and meat safety," indicating a need for effective, continuing food safety training of workers in hunger-relief organizations that increases knowledge and safe food handling behaviors (Finch and Daniel, 2005; Smith et al., 2014).

Objectives of Thesis

This literature review explored the connection between hunger, poverty, obesity and malnutrition and how these factors relate to food insecurity. It outlined the role that food insecurity plays in the development of overweight and obesity and the cycle of food insecurity that traps so many Americans. Government food and nutrition programs and hunger-relief organizations have been a theorized solution to these issues in the community, yet challenges to these programs have been identified. Feeding America and their member food banks in S.C. are hoping to alleviate problems and reduce barriers by implementing nutrition and food safety initiatives and programs. The objectives of this thesis are to: 1) determine nutrition and food safety educational needs of food pantry volunteers in South Carolina, 2) identify commonalities in policies, procedures and practices among food pantries in South Carolina, 3) identify commonalities in characteristics of food pantry supervisors and volunteers in South Carolina and 4) develop and deliver a training curriculum for food pantry volunteers in South Carolina.

CHAPTER TWO

VOLUNTEER TRAINING AND DATA COLLECTION

INTRODUCTION

Rules, policies and procedures in place at food pantries keep operations running smoothly. Volunteers, staff and clients follow rules, policies and procedures to keep everyone safe, healthy and fully functioning. Food pantries operate on low budgets and limited time, often relying on volunteers to keep their doors open (Kim et al., 2001). Past research has determined that over 93% of food pantries use volunteers, including the food banks and food pantries in S.C. (Kim et al., 2001). In 2018, volunteers in member food pantries put in over 150,000 hours of service, saving S.C. food banks and food pantries millions of dollars in labor expenses (Harvest Hope Food Bank, 2019f; Lowcountry Food Bank, 2019h; Second Harvest Food Bank of Metrolina, 2018e; Golden Harvest Food Bank, 2019a). Two major areas of training for food pantry volunteers in S.C., food safety and nutrition, have been identified by Food Bank Supervisors and current literature (Finch and Daniel, 2005; Chaifetz and Chapman, 2015). Food safety education is important in reducing the spread of foodborne illnesses in client populations (Finch and Daniel, 2005). Nutrition education through nutrition nudges, classes and other nutrition initiatives strive to positively affect the health of client populations by improving nutrient intake (Mousa and Freeland-Graves, 2018).

Foodborne illness, while preventable, still affects millions of individuals in the U.S. often due to unsafe handling practices (Finch and Daniel, 2005). Hunger relief organizations and food pantries often face food safety challenges due to the populations

served, the "high-risk behaviors" of these populations and insufficient training for hunger relief volunteers (Finch and Daniel, 2005). Children, pregnant women and elderly and immunocompromised individuals are vulnerable populations and become ill when consuming less of the contaminated food (Kwon et al., 2013; Finch and Daniel, 2005). These vulnerable populations, especially those of low socioeconomic status, are also more likely to suffer from food insecurity and frequent food pantries (Verpy et al., 2003; Chaifetz and Chapman 2015). Some coping strategies, such as eating other's leftovers or eating food that is past the date on the package, affect the safety of their food (Finch and Daniel, 2005). Low-income populations that are clients at food pantries may have limited access to housing, electricity, water and transportation (Finch and Daniel, 2005). Consequently, this may lead to perishable food being left out of refrigeration too long or food insufficiently cooked or washed, ultimately increasing the risk of foodborne illness for these populations (Finch and Daniel, 2005; Kwon et al., 2013). For these reasons, food safety education, knowledge and safe behaviors among food pantry workers is extremely critical to the health and safety of food pantry clients (Finch and Daniel, 2005; Chaifetz and Chapman, 2015).

Chronic disease affects an estimated 117 million individuals, one half of the population in the U.S., most of the chronic diseases diet-related or physical exercise-related (CDC, 2015). Food pantries provide a substantial portion of the total food consumed by some individuals. Studies have shown food from food pantries may lack some essential nutrients (Adobundu et al., 2004; Farahbakhsh et al., 2017; Schneider et al., 2017). Most food pantry clients fall into the cycle of food insecurity, starting with

lack of financial resources (Mousa and Freeland-Graves, 2018). Lack of financial resources may lead to inadequate nutrient intake from cheap, high calorie, low nutrient foods. Inadequate nutrient intake may lead to health problems over time, wages lost from illness and medical costs impacting financial resources. Educating volunteers on the importance of adequate nutritional intake to maintenance of overall health is integral in implementing nutrition into a food pantry setting.

To implement changes in a food pantry, the operations of food pantries must be studied. Operations, management and resources determine how much change can be implemented in each individual pantry. Knowing the daily operations, the training and management of volunteers and how well each pantry follows standard food safety procedures can be helpful in determining effective education for food pantry volunteers. Past research has studied the operations in North Carolina food pantries (Chaifetz and Chapman, 2015). This study sought to 1) identify commonalities in policies, procedures and practices among South Carolina food pantries, 2) identify commonalities in characteristics of food pantry supervisors and volunteers in South Carolina, 3) determine nutrition and food safety educational needs of South Carolina food pantry volunteers and 4) develop and deliver a training curriculum for South Carolina food pantry volunteers. The following portion of the study discusses the results of the data gathered from the Food Pantry Supervisor Survey, containing questions regarding operations of the food pantry, characteristics of food pantry supervisors and how supervisors manage volunteers.

MATERIALS AND METHODS

IRB Statement

This study was approved by the Institutional Review Board in the Office of Research Compliance for Human Studies at Clemson University (IRB2018-283). This training was supported by the Grant or Cooperative Agreement Number, NU58DP005490, funded by the Centers for Disease Control and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention or the U.S. Department of Health and Human Services.

Objective 1: Determine nutrition and food safety educational needs of food pantry volunteers in South Carolina

Food Bank Director Interviews

S.C. has four food banks that serve the entire state and the four Directors were interviewed in-person during the first phase of FPVT development. In-person interviews of S.C. Food Bank Directors were conducted to identify knowledge gaps in food safety and nutrition among food pantry volunteers. Prior to the interviews, the purpose and procedures of the study were explained, and the Food Bank Directors were asked to provide their consent. They were informed both before and during the interviews that they could end the interview at any time. Verbal responses to the questions were recorded. During the initial interview, each Director was interviewed on-site at their food bank.

Food Bank Related Questions

During the first in-person interview, the Directors were asked about their training policies and procedures, training topics provided to food pantries, methods of training delivery and any additional knowledge gaps that they observed among their food pantry supervisors and volunteers. Specific questions during the in-person interviews included barriers to food bank and food pantry success and sufficient methods for food/non-food procurement and information presented at annual food bank trainings (Appendix C).

Food Pantry Related Questions

Directors were also asked about member food pantry typical characteristics, typical food pantry volunteer tasks, need for food safety and nutrition interventions/trainings for food pantry supervisors as well as those in place, perceived food pantry concerns with fresh produce procurement and future training directions and needs.

Objective 2: Identify commonalities in policies, procedures and practices among South Carolina food pantries

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Objective 3: Identify commonalities in characteristics of South Carolina food pantry supervisors and volunteers

"Food Pantry Supervisor Survey" Creation

A survey was developed for S.C. Food Pantry Supervisors to identify commonalities in characteristics among food pantries, Pantry Supervisors and Pantry volunteers and to pose questions related to food safety and nutrition issues. Questions

were selected and modified from previous studies (Chaifetz and Chapman, 2015) along with original questions developed by the graduate student author of this thesis, Clemson University (CU) Cooperative Extension Service staff, CU food safety specialists and CU statistician. The questions were designed to answer concerns posed by SC DHEC and to identify education needs of food pantry volunteers. After determining topics and questions, the survey team revised and reviewed the survey layout and answer options.

Questions included in the survey were modified from preview studies or created by the Clemson University team (Chaifetz and Chapman, 2015). Each question went through a series of validity tests, looking at diction, reading level, phrasing and understandability. Questions were periodically pilot tested for validity by Food Bank Directors and the Clemson University team to guarantee proper diction, relevant questions and clear answers for a food pantry setting. Because food pantry settings vary so widely, a wide variety of options for answers were provided. For questions with numeric answers, groupings and ranges of numbers were reviewed from previous studies to increase data clarity. Keeping equal distribution of answers for proper distribution, research on formatting allowed focus on variables of concern. Wording for these questions are clear and concise, using terminology relevant to the Feeding America network, such as client, member food pantry and other terminology. Questions regarding training topics were vetted for clarity and relevance to training that food pantry supervisors may have already been received to get the most accurate answers. For questions regarding volunteer tasks, Food Bank Directors were asked to review the

answer options created by Clemson University team from previous studies and volunteer experience working with food pantries (Chaifetz and Chapman, 2015).

"Food Pantry Supervisor Survey" Execution and Data Collection

Food Pantry Supervisor Surveys were administered online or in-person at events hosted by Clemson University. Seven different events were held at various locations in S.C.. The events included a demonstration and explanation of the FPVT Program, a culinary demonstration and survey data collection. The event attendees were Food Pantry Supervisors or their representatives. The survey questions and answers remained the same regardless of the type of survey (paper or online), and all of the questions were multiple choice with four answer option. Paper and on-line surveys included the following informed consent and other information:

"Informed Consent and Other Important Information

I am conducting research about characterizing food pantry supervisors and volunteers and I am interested in your experiences as a food pantry supervisor or volunteer. The purpose of the research is to characterize food pantry supervisors and perform a needs assessment. Your participation will involve one survey that will last between thirty minutes and an hour. This research has no known risks. The information obtained during this study will be used to determine knowledge gaps that can then be filled to reduce foodborne illness and improve nutrition of food pantry recipients. Please know that I will do everything I can to protect your privacy. Your identity or personal information will not be disclosed in any publication that may result from the study. Your answers will be saved anonymously

and kept anonymous throughout the study. Your answers will not affect your relationship or status as a member at your respective food bank.

IRB number: IRB2018-283

Clemson University Cooperative Extension Service offers its programs to people of all ages, regardless of race, color, gender, religion, national origin, disability, political beliefs, sexual orientation, marital or family status and is an equal opportunity employer."

The paper survey consisted of 5 pages front and back in Times New Roman size 14 font. Respondents were requested to put their agency ID and email address on the back of the survey. The online survey was hosted by Qualtrics, where the participants were also prompted to input their agency ID and email address. In the online version, the participants were also required to state that they had read the "Informed Consent and Other Important Information" to proceed to the survey questions (Appendix D).

The data collected from the paper surveys were entered into a Microsoft Excel file on a password protected computer. Data collected from the online surveys were downloaded into a Microsoft Excel file on the same password protected computer. Both sets of data were compiled, marked by email, agency ID, affiliated food bank and state. After compiling the data from all events, a statistical analysis was performed.

Statistical Methods

Summary statistics were determined for a subgroup of data dependent on supervisor status from the Food Pantry Supervisor Survey. The analyses were performed using the frequency procedure in SAS® Studio (2002-2017, SAS Institute Inc., Cary, N.C., USA). Statistical significance was determined at the 5% level.

Decision to Exclude North Carolina Data

In S.C., one of our Food Banks in the Upstate served food pantries and meal programs that crossed state lines into North Carolina. The decision to exclude data gathered from North Carolina was decided using multiple factors. First, the funding for this project was from S.C. Department of Health and Environmental Control and those funds only covered data collection from S.C. Food Banks and Pantries. Second, only 88 surveys were collected from North Carolina Supervisors or their representatives during one event. Within the Feeding America system, North Carolina has 7 food banks serving their state compared to 4 food banks in S.C., and the decision was made to exclude these data to ensure that results were reflective of S.C..

Objective 4: Develop and deliver a training curriculum for South Carolina food pantry volunteers

Development of Food Pantry Volunteer Training (FPVT) Modules

Topics chosen for the FPVT were unanimously identified by the S.C. Food Bank Directors as 'high needs' areas for volunteer training. These topics, shown in Figures B.1 and B.2 in the following sections, were reviewed and approved by the S.C. Department of Health and Environmental Control (SC DHEC). The overarching goal of the project was to support educational programming that would increase the distribution and support safe handling practices of fresh produce by S.C. food banks and food pantries. To get the fresh produce into food pantries, barriers such as insufficient refrigeration, inefficient resource use and lack of specialized education must be overcome. The topics were chosen to supplement education needed for fresh produce, to increase the knowledge of food pantry

volunteers and to increase the likelihood that knowledge would be transferred to increase the health and wellbeing of clients. The FPVT nutrition and food safety module outlines were created through the collaborative effort of a Registered Dietitian (RD), Food Safety Specialist, and the graduate student author of this thesis. The graduate student then adapted the voiceover and PowerPoint slide presentations to create the modules in TechSmith Camtasia Screen Recording and Video Editing Software. The ".tscproj" file (TechSmith Project) was then converted to a Custom Presentation in order to include interactive hotspots connecting to additional resources. This Custom Presentation was uploaded to an online smart player (TechSmith Smart Player) that can be accessed by a special uniform resource locator (URL). The modules were then reviewed by the Lowcountry Food Bank (Charleston, SC) Registered Dietitian and edited accordingly. Following the completion of the revisions, the Food Bank Directors and two additional Registered Dietitians reviewed and critiqued the FPVT modules to guarantee their relatability to the population and accurate representation of the material. The modules were modified to include suggestions from the Food Bank Directors and Registered Dietitians. A final review was then conducted by the graduate student and her thesis advisors.

The FPVT modules were organized into two sections: nutrition topics (Modules 1-3) and food safety topics (Modules 4-6). These sections were then divided into modules covering large topic areas, about thirty to forty minutes each. They were then divided into presentations, around ten to fifteen minutes each, covering a single topic in its entirety. Pre-tests and post-tests for both nutrition and food safety topics were placed before and

after the nutrition topic modules (Modules 1-3) and food safety topic modules (Modules 4-6) respectively. Presentations were limited to 10-15 minutes to enhance information retention and allow time for work activities after training during a routine block of volunteer-time. The anticipated barriers and limitations from the Food Bank Director interviews were addressed in the FPVT Modules through education and application of material presented.

Module 1 – "Basic Nutrition Principles"

Module 1 entitled "Basic Nutrition Principles" focused on nutrition issues surrounding food banks and food pantries: food insecurity, role of food banks and food pantries, MyPlate food groups and the Nutrition Facts Label and its application. In the first presentation entitled "Food Insecurity", food insecurity and its potential consequences were defined, as well as food insecurity's relationship to poverty. A common scenario in a food-insecure household was explained, describing how an income of someone in poverty used for utilities, rent, transportation and education costs leaves little money for food. Statistics of food insecurity and hunger in the U.S. and S.C. are presented and the role of the Feeding America network of member food banks and food pantries is examined. Examining the life of those in a food insecure household provided poverty sensitivity, a topic identified by Food Bank Directors as a need for Food Pantry Volunteers. The second presentation entitled "MyPlate Icon and Food Groups" addresses another anticipated barrier identified by Food Bank Director, nutrition education. MyPlate guidelines such as, focusing on fruit, varying your veggies, making half your plate fruits and vegetables, going lean with protein, getting your calcium-rich foods and

making at least half your grains whole grains are discussed. Identifying how to implement these guidelines into a food pantry such as suggestions for donors and how to choose nutrient dense alternatives were included in this presentation. The third presentation entitled "Nutrition Facts Label and Application" continued to explore food groups and the Nutrition Facts Label, identifying "sometimes foods" and what nutrients to focus on to classify "sometimes foods". The presentation ended with information on physical activity and how those in impoverished areas can get physical activity in a safe way, as a poverty sensitivity training component.

Module 2 – "Planning, Shopping and Cooking"

Module 2 entitled "Planning, Shopping and Cooking" focused on how to plan, shop and cook food on a small budget and finding ways to stretch the food dollar. Building on the poverty sensitivity training, the first presentation entitled "Planning Meals" explored the approach that volunteers can take to open the line of communication about budgeting for food. This presentation included meal planning throughout the week from how to create a grocery list, efficiently use leftovers and choose in season produce. Presentation two entitled "Smart Shopping" explores fresh, frozen and canned options and which options to choose to save money. Advice on how to shop, how to make fresh produce last longer, how to shop in season and how to look for deals in grocery stores can help individuals stay healthy and on budget. Education on shelf life and the management of inventory could help reduce food waste in the food pantry. Information presented in this presentation can equip volunteers with knowledge they could pass on to donors, including low sodium and low sugar canned and frozen options. Also included in the

second presentation is a tour of the S.C. Farm to Institution website, exploring in season produce and recipes with produce that is locally grown. Introducing new foods and how to serve or cook them addresses a training need identified by the Food Bank Directors. The third presentation in Module 2, entitled "Following Recipes for Healthy Cooking," addressed a barrier identified by one of the Food Bank Directors: how to follow a recipe and improve the health of familiar recipes. Focusing on encouraging home cooking, the presentation outlined how to stock the food pantry with nutrient dense recipe friendly basics.

Module 3 – "Nudges"

Module 3 entitled "Nudges" used the knowledge from the first two modules and translated it into the food pantry setting, exploring nudges, taste testing and food demonstrations. Examples of subtle environmental changes in food distribution settings that nudge individuals to make healthier choices were explored and examples of integration were given in the first presentation, "Introduction and Examples of Nudges". Nudge strategies that were commonly used in grocery stores, convenience stores and other food distribution establishments were explored including convenience, display change, multiple exposures and priming. Examples of nudges in client choice and traditional pantries were explored, addressing barriers to space, manpower and funding in each pantry type. Presentation 2 entitled "Taste Testing" outlined steps to creating a successful taste test program, addressing a training need identified by the Food Bank Directors. The Directors were concerned about the lack of openness of volunteers and clients when trying new foods and recipes and a taste test would offer opportunities to try

new items without risk. The second presentation introduced resources with additional taste testing information. The third presentation, "Cooking/Food Demonstrations" extensively described the steps for a cooking demonstration, integrating the *Cooking Matters* program content into the presentation through links to online videos. The steps to a successful cooking demonstration, along with print outs for each step and presentation tips were included.

Module 4 – "Food Safety and Cross Contamination"

Module 4 entitled "Food Safety and Cross Contamination" started the food safety portion of the modules, giving an overview on how food becomes contaminated, what causes the contamination and the food poisoning that may occur from consuming contaminated food. Presentation one entitled "Introduction to Food Safety" identified susceptible characteristics in high foodborne illness risk populations that may visit the food pantry. Food poisoning symptoms were identified in addition to the major types of microorganisms and foodborne pathogens and their source and symptoms. The second presentation entitled "How Food Becomes Contaminated" explored what microorganisms need to survive, the specific ways that food becomes contaminated and a few rules to follow to keep foods safe. Food can be contaminated in many ways including but not limited to people, pests, ingredients, sewage and packaging material. This presentation started the conversation about safe food handling, time and temperature abuse, proper sanitation and cleaning and procedures to minimize food waste. One of the first steps to risk management is knowing the risks and this module was the foundation for the rest of the training.

Module 5 – "Safe Food Handling"

Module 5 entitled "Safe Food Handling" included proper sanitation, worker hygiene and rodent and pest control. The first presentation entitled "Proper Sanitation" explored the building, grounds and equipment of a safe food facility, cleaning techniques and proper sanitation. A safe food facility includes a properly sealed building, cleanable food and non-food contact surfaces, proper ventilation, adequate lighting, clean storage facilities, working equipment and clean restrooms with proper plumbing. Cleaning and sanitizing require steps and measurements that must be followed to achieve a safe work environment. The presentation outlined specifics on different types and concentrations of sanitizers as well as tips for cleaning materials and supplies. The second presentation entitled "Worker Hygiene" explored the role of a food handler in the safety of the food that they handle, prepare or store. Worker hygiene, from showering, to wearing clean clothes, to washing your hands properly, are part of protecting clients from food safety concerns. Volunteers have a responsibility to the clients to serve safe food, stay home from work when they are sick and to cover their cuts and wounds. This presentation reminded volunteers of this responsibility and rules to remember when handling food. The third presentation entitled "Rodent and Pest Control" explained what pests, rodents and insects need to survive, ways to keep them out of the building and common treatments for common pests. Keeping the facility clean with no access to the outdoors will reduce the access that pests may have to the food, but the presentation identifies the common signs in case of an infestation.

Module 6 – "Risk Management"

Module 6 entitled “Risk Management” explored the role of food safety in the food intake process. The first presentation, “Risk Analysis and Assessment Process,” outlined a step by step process for accepting, sorting and storing food and nonfood products. Package dates, label qualifications, quality standards, reject conditions and recommended storage conditions were explored in the presentation. Risk analysis was used to review all food and nonfood items, looking at indicators such as tamper proof seals intact and no cracks or large dents as well as the proper disposal technique for rejected food. Produce contamination, one of the main objectives from the Centers for Disease Control and Prevention, was outlined with resources such as the CDC and other food safety government websites. The second presentation in the module was dedicated to risk analysis for cans, entitled “Canned Food Assessment Process,” provided detailed pictures and descriptions of cans that should be rejected or accepted according to food safety protocols. Home canning and risk of *Clostridium botulinum* were explained, an important topic to cover especially in areas where home canned goods may be accepted.
Figure B.1 provides an outline of the FPVT Training Modules and Figure B.2 shows the objectives of each module.

Outline of FPVT Modules

The outline of the FPVT Modules was developed with background information, progressing from simple to complex concepts, while testing knowledge as the participant proceeded through the program.

I. Nutrition Pre-Test
II. Module 1 – Basic Nutrition Principles
    a. Presentation 1.1 – Food Insecurity

b. Presentation 1.2 – MyPlate Icon and Food Groups
c. Presentation 1.3 – Nutrition Facts Label and Application

III. Module 2 – Planning, Shopping and Cooking
a. Presentation 2.1 – Planning Meals
b. Presentation 2.2 – Smart Shopping
c. Presentation 2.3 – Following Recipes for Healthy Cooking

IV. Module 3 – Nudges
a. Presentation 3.1 – Introduction and Examples of Nudges
b. Presentation 3.2 – Taste Testing
c. Presentation 3.3 – Cooking/Food Demonstrations

V. Nutrition Post-Test

VI. Food Safety Pre-Test

VII. Module 4 – Food Safety and Cross Contamination
a. Presentation 4.1 – Introduction to Food Safety
b. Presentation 4.2 – How Food Becomes Contaminated

VIII. Module 5 – Safe Food Handling
a. Presentation 5.1 – Proper Sanitation
b. Presentation 5.2 – Worker Hygiene
c. Presentation 5.3 – Rodent and Pest Control

IX. Module 6 – Risk Management
a. Presentation 6.1 – Risk Analysis and Assessment Process
b. Presentation 6.2 – Canned Food Assessment Process

X. Food Safety Post-Test

Figure B.1. Outline of Food Pantry Volunteer Training Modules

Objectives of FPVT Modules

Module 1

Presentation 1.1

1. **Define food insecurity**
2. Recognize the effects of poverty on food insecurity
3. **Relate and gain an understanding of the potential consequences of food insecurity**
4. Identify actions being taken to relieve people from food insecurity
5. Recognize the mission of Feeding America

Presentation 1.2

1. Identify the *MyPlate* icon
2. **Explain how *MyPlate* serves as a reminder to eat from all five food groups**
3. Identify the five food groups of *MyPlate*
4. Name a variety of examples from each

Presentation 1.3

1. Identify tools that can be used to "know what's in our foods"
2. Identify "sometimes foods" from MyPlate guidance
3. Find nutrients related to "sometimes foods" on a Nutrition Facts Panel
4. Understand recommendations for physical activity from MyPlate guidance
5. Create 4 healthy dinner meals using the MyPlate guidance with items from the food pantry

Module 2

Presentation 2.1

1. Identify the guidelines of the USDA's Low Cost Food Plan used to determine SNAP benefits
2. Describe the ways you can use the Low Cost Food Plan guidelines to assist clientele
3. Understand the benefits of menu planning
4. List the steps for healthy menu planning
5. Understand the benefits of creating a grocery list from a menu plan

Presentation 2.2

1. Understand the basic layout of a grocery store and the best way to progress through it for health and budget
2. Identify three common packaging forms of fruits and vegetables found in grocery stores
3. Identify benefits and limitations for each of the three packaging forms of fruits and vegetables found in the grocery store
4. **Identify "in season" and resources to help you determine "in season" produce in South Carolina**
5. Describe ways to select, store, and prepare fresh produce and resources for these products

Presentation 2.3

1. Identify why an organized refrigerator can save time and money
2. Understand how to stock your pantry to promote healthy cooking
3. Identify resources that encourage home cooking
4. Describe the process for reading and using a recipe
5. Identify ways to improve the health of existing recipes

Module 3

Presentation 3.1

1. Define "Nudge"
2. Understand the purpose of a nudge
3. Understand common nudge strategies
4. Identify nudge strategies in common examples
5. **Identify nudge opportunities in the food pantry**

Presentation 3.2

1. Define a taste test program
2. Identify reasons for conducting taste tests in the food pantry
3. Describe steps for conducting a taste testing program
4. Identify tips for successful taste tests
5. Identify resources for developing and delivering a taste testing program

Presentation 3.3

1. Define a cooking demonstration
2. Identify reasons for conducting a cooking demonstration
3. Describe steps for conducting a cooking demonstration
4. Identify tips for a successful cooking demonstration
5. Identify resources for developing and delivering a cooking demonstration

Module 4

Presentation 4.1

1. Identify the characteristics of a "safe food"
2. Identify categories of foods that are more likely to cause food poisoning than others
3. Identify high risk populations for food poisoning
4. Match susceptible characteristics with the target population
5. Identify symptoms of food poisoning
6. Identify major types of microorganisms
7. Identify major foodborne pathogens, their source and symptoms

Presentation 4.2

1. Identify factors that affect the growth of microorganisms
2. Recognize the need for caution when handling food that could become 'potentially hazardous'
3. Identify how foods can become unsafe
4. Recognize characteristics of foods that support growth of microorganisms
5. Recognize need for proper storage to prevent contamination and cross-contamination
6. Practice First-In First-Out product rotation
7. Identify other sources besides microorganisms that can make foods unsafe for consumption

Module 5

Presentation 5.1

1. Recognize the importance of maintaining the environment and facility to make it easier to clean
2. Recognize situations that could result in cross-contamination
3. **Identify characteristics of appropriate food-contact and non-food contact surfaces**
4. Identify proper methods of food disposal
5. Identify the basic sequence for cleaning and sanitizing

6. Recognize the importance of using chlorine correctly
7. Recognize the dangers of not using chlorine correctly

Presentation 5.2

1. Recognize their role as a food handler and how they can impact food safety
2. **Identify when and how to properly wash hands**
3. Recognize the importance of protecting clients from food safety concerns
4. **Recognize that food handlers can cross-contaminate food**
5. **Recognize the importance of not handling food when sick/ill**
6. Identify proper hand-covering for wounds

Presentation 5.3

1. Identify the basic requirements that support growth of pests/rodents
2. Identify methods to minimize presence of rodents/pests when prompted
3. Recognize the need for frequent waste removal to prevent odors, pests/rodents and cross-contamination
4. Recognize the proper action to take when discovering pest/rodents on-site

Module 6

Presentation 6.1

1. **Identify accept or reject criteria for receiving refrigerated food, frozen food, dry food and non-food items**
2. Recognize the importance of organizing and sorting 'goods'
3. Identify items that need further examination before storing
4. Recognize characteristics that may cause contamination of cans, bottles and jars when prompted
5. Identify proper disposal techniques for unacceptable items
6. Recognize characteristics that may cause contamination of fresh produce

Presentation 6.2

1. Recognize characteristics that may cause the contamination of cans
2. Identify proper disposal techniques for unacceptable items

***Bolded objectives were used as the basis for pre-/post-tests.**

Figure B.2. Objectives of Food Pantry Volunteer Training Modules

Creation of Pre-/Post-Tests for FPVT Modules

The pre-tests and post-tests were developed and created by the author of this thesis under the advisement of a Clemson University statistician and survey expert. These tests were based on the objectives outlined in bolded text in Figure B.2. The questions for the pre-tests and post-tests would be accessed from Qualtrics Survey Software (Qualtrics,

Provo, UT) using a hyperlink. Each question was a multiple choice format with four options from which to choose one answer, and answers had to be submitted to finish the test. Before answering any questions, the participants were instructed to only complete the test before or after watching the respective module. Participants were also asked to confirm their email address, their birthday (mm/dd), and that they were at least 18 years old. The email address and birthday were used to link pre-test and post-test data for analyses. Birthday was used only when there were two or more participants with the same name. The data from the pre-/post-tests was not reported in the thesis because data collection was not complete.

Access via Online Host Portal

During the creation of the training program, the modules were viewed through the TechSmith Smart Player, but the final program was compiled and hosted by an online host portal, Aerie Engineering (804 Pendleton Street, Greenville, SC 29601. https://www.aeriehub.com/Home/About) through their online portal, AerieHub. This online host portal provided a way to distribute and track participants in the training program. To facilitate this, the online host portal provided a registration link that was distributed via email through the food bank directors to food pantry supervisors via email. The link was also posted online through the Clemson University Cooperative Extension Service, Rural Health and Nutrition Program homepage (https://www.clemson.edu/extension/health/index.html). The ability to register was also password protected to ensure data purity. Food pantry supervisors were given the password and instructed to provide it to volunteers in their pantry. The Food Pantry

Supervisors also confirmed that the individuals they distributed the password to were at least 18 years old. In the self-registration process, participants were prompted to enter the following information in free-text or dropdown fields: First Name, Last Name, Email, Birthday (mm/dd), Address Line, City, State, Zip, Ethnicity ("Hispanic or Latino", "Non-Hispanic or Latino" or "I prefer not to answer"), Race ("White", "Black", "American Indian", "Alaskan Native", "Native Hawaiian", "Pacific Islander", "Asian", "Other / More than 1 Race" or "I prefer not to answer"), Gender ("Male", "Female", "Other" or "Prefer not to answer"), Agency ID, Age ("18 – 29", "30 – 49", "50 – 69", "70 +" or "Prefer not to answer") and Group ("Harvest Hope Food Bank", "Lowcountry Food Bank", "Second Harvest of Metrolina Food Bank" or "Golden Harvest Food Bank"). After entering the information for their profile, the participant submitted the information and an email was sent to the email address provided. They could then continue to the FPVT modules and start the training or use the link that was sent to their email address at a later time.

The online host portal is a web-based solution that allows registered participants to access training videos. Figure B.3 shows a snapshot of the portal displaying the modules. Within the portal, the modules were organized in the following manner: Nutrition Pre-Test, Modules 1-3, Nutrition Post-Test, Food Safety Pre-Test, Modules 4-6 and Food Safety Post-Test. The videos were grouped by module and were meant to be viewed in order but can be viewed multiple times until they are hidden using a "viewed" button. For example, if Module 1 Presentations 1, 2 and 3 were viewed and the participant wanted to go back and view Module 1 Presentation 1, they could do so until

they click the “viewed” button after the last presentation of each module. After the “viewed” button was clicked, all the videos in the module were hidden to track the participant’s progress within the training. One limitation of the portal was it allowed the participant to take the pre-test or post-test whenever they wanted which may have resulted in inaccurate data. The “viewed” button also allowed us to track the participant’s status within the portal, regardless of the participant’s role, explained in the next section. At the end of the training, after watching all of the modules, the participants were issued a certificate of completion.

Figure B.3. Snapshot of the online host portal holding the modules displaying link to download Module 1 PowerPoint (804 Pendleton Street, Greenville, SC 29601. https://www.aeriehub.com/Home/About).

Roles within Online Host Portal

During the development of the training program, it was discovered that different individuals needed access to different sets of data within the online host portal. The Food Bank Directors needed access to data affiliated with the food pantries assigned to their district, and the Food Pantry Supervisors needed access to data associated with individuals within their agency. As a result, the host portal created multiple administrative and user roles based on these unique needs. The four roles created for this project were: Clemson Training Administrator, Group Administrator, Group User and Individual. "Clemson Training Administrator" included only the Clemson individuals that created the training program and had access to all data and user profiles. The Group Admin role was assigned to Food Bank Directors, allowing them to see all the users that registered for the training program within their food bank district. The Group User role was assigned to Food Pantry Supervisors and allowed them to see data from those individuals who registered for the training under their agency's ID. This allowed the Food Pantry Supervisors and Food Bank Directors to follow the food pantry volunteers' progress through the training program. This feature also allowed the Food Pantry Supervisors and Food Bank Directors to use the training program as a required education component of their annual meeting or volunteer training.

Within the online host portal, different actions could be performed by the Clemson Training Administrator, Group Administrator and Group Users allowing them to view, search, and organize data from individuals. Clemson Training Administrator had the most authority within the system and could create 'groups' of individuals based on

affiliation with a food bank for tracking purposes. They could also archive these groups, add, edit and archive individuals, email individuals about their training, view and write comments on groups and individuals and they could assign roles (Group Admin and User). The Clemson Training Admins determined who was assigned the other roles. Group Admins could do all the following tasks within their group: see data, add, edit and archive individuals, email individuals their training, view and write comments on individuals and assign roles (Group Admin and User) only within their group. This allowed for Group Admin (food bank supervisors) to assign the role of Group User to food pantry supervisors. Group Users could do all the following within their group using their Agency ID to sort individuals: see data, add, edit and archive individuals, email individuals their training, view and write comments on individuals and assign roles (Group User) only within their group. The Agency ID was gathered during self-registration and had to be entered correctly when an individual registered or the Group User would not be able to correctly sort the individual to determine the status of their training. The different roles and accessibility were a critical component of the training module to ensure integrity of the data without sacrificing the availability of the data to the Food Bank and Food Pantry Directors/Managers and Supervisors.

RESULTS

Preliminary Data

Preliminary data were gathered during in-person interviews with Food Bank (FB) Supervisors of *Feeding America* member food banks in S.C.. Paraphrased results from

the interviews are shown in Table 2.12 in Appendix C. Each food bank had different concerns and emphasis areas, are led and supported by different groups of people and are serving different clienteles. There were, however, some notable similarities which include, but are not limited to annual trainings, agency membership requirements, senior and child hunger programs, avenues for food and nonfood item procurement, and barriers to reduce food insecurity in client populations. All food bank directors indicated that their volunteers needed more training on various subjects unique to problems that the food banks encountered. Training on how to recruit, train and manage volunteers on a variety of topics was unanimously mentioned by the FB Directors. Consistent training themes that surfaced included food pantry volunteer training needs on nutrition nudges, recipe how-to, cultural sensitivity, poverty sensitivity and volunteer management skills.

Directors mentioned annual food bank trainings were held, with some food banks requiring yearly renewal of membership. Fresh produce concerns included lack of refrigerated storage, adequate recipe knowledge and produce safety education. Due to low or no funding, food pantry operations rely heavily on volunteers while providing minimal education or training. Volunteer training needs voiced among one or two food banks included education on volunteer recruitment methods, fundraising methods, volunteer management, cultural sensitivity and task-oriented training. Training needs mentioned by all Directors were considered while identifying topics for volunteer training, intended to save time for Food Pantry Supervisors and standardize food safety and nutrition education. Online video modules were determined most efficient for use in food pantries due to lack of time, resources and high turnover of volunteers. Directors

identified perceived barriers to food bank and pantry success as (1) lack of volunteer nutrition education, transportation and time management skills, (2) lack of community support, (3) lack of adequate equipment and (4) lack of openness to new recipes and foods. Directors mentioned receiving food and non-food items mostly from grocery stores, convenience stores and supermarkets through food rescue programs and donations. Food was infrequently received from farmers but Directors were hoping to receive more fresh produce in the future.

Food Pantry Supervisor Survey Feedback

After the in-person interviews with the FB Directors, a survey of S.C. Food Pantry Supervisors was conducted to determine training needs. The survey was administered either in-person or on-line to over 370 food pantries across S.C., with a return response rate of 58 percent. Previous research has reported that a return response rate of 56 percent or higher for paper surveys and 33 percent or higher for online surveys is acceptable for inferring relationships (Nulty, 2008). The three main categories of training feedback and topics as identified by survey respondents were program implementation, requirements from food banks and client reception (Table 2.1). The concept behind the FPVT Modules was presented to the Food Pantry Supervisors after they had completed the survey. In an open forum comprised of Food Pantry Supervisors, feedback was collected on the design and implementation of the FPVT Modules. concern. Several voiced anticipated barriers related to lack of computer and refrigeration equipment at the food pantry along with feedback on the ability of the volunteers, which varied widely. Computer and internet access were issues for low resource food pantries

and food pantry volunteers. Agencies anticipated that FB Directors were going to make the FPVT Modules mandatory. For food pantries, the focus was to distribute the food as quickly as possible to those in need; therefore, time was critical. Additionally, requirements for Feeding America membership would put a stress on food pantry operations. Agencies also voiced anticipated limitations surrounding how they felt their volunteers and clients would view the FPVT program. Finding that change was especially difficult in a food pantry setting, they voiced perceived limitations about implementing some of the changes that the FPVT program suggests, such as changes in food procured and layout changes. These anticipated limitations and barriers were taken into consideration during the final design of the FPVT Modules. Consideration of incentivizing completion of the FPVT Modules was discussed but only monetary incentives were feasible, and funds were not available.

Table 2.1. Feedback from Data Collection Events

Program implementation	**Required for FB membership**	**Client reception**
Computers may not be available at pantry for volunteers to complete training on-site	Probably not possible for all volunteers	Clients not interested in nutrition education or nudges
Volunteers may not have access to computer at home and may not have transportation to the library	Worried about it being “just one more thing” they have to do to comply with food bank regulations	Clients aren’t receptive to changes, especially those that cost money
Too hard for volunteers to navigate to the website		
Can’t make as many changes in traditional style pantry as in client-choice style		

Food Pantry Supervisor Survey Results

Survey results were sorted into two groups according to whether or not the respondents supervise volunteers at the food pantry. Previous research examined data from food bank members versus nonmember food pantries and natural disaster shelters and nonprofit organizations that assist those in need (Finch and Daniel, 2005; Kwon et al., 2013; Chaifetz and Chapman, 2015; Smith et al., 2015). Previous research reported on the effect of food safety education on knowledge and behavioral changes of volunteers in emergency food relief settings (Finch and Daniel, 2005; Smith et al., 2014). While testing the effectiveness of food safety education, data on volunteers, such as length of service, age and prior education, were also gathered (Finch and Daniel, 2005; Chaifetz and Chapman, 2015; Smith et al., 2015). Chaifetz and Chapman (2015) specifically gathered information on practices, policies and procedures in place, mostly regarding practices that could affect the safety of the food at the pantry (Chaifetz and Chapman, 2015). The results from the study by Chaifetz and Chapman (2015) will be discussed in the Results section.

The respondents of the survey were a mix of Food Pantry Supervisors as well as their representatives. To get the most accurate data and knowledge of Food Pantry Supervisors, questions on the survey asked about supervisor status, as well as the status of supervisors of volunteers. Supervisors of volunteers should have a more direct link to the knowledge passed down to pantry volunteers. The number of respondents from each food bank, inclusion and exclusion group is described in Figure B.4 and Table 2.2. The survey was completed by 316 respondents (Figure B.4). Respondents that served North

Carolina food pantries (n = 89) were excluded and data gathered from pantries serving S.C. (n = 219) were analyzed for statistical significance (Figure B.4 and Table 2.2). Of the S.C. respondents, the results from those who answered that they were supervisors of volunteers (n = 162) were analyzed (Figure B.4).

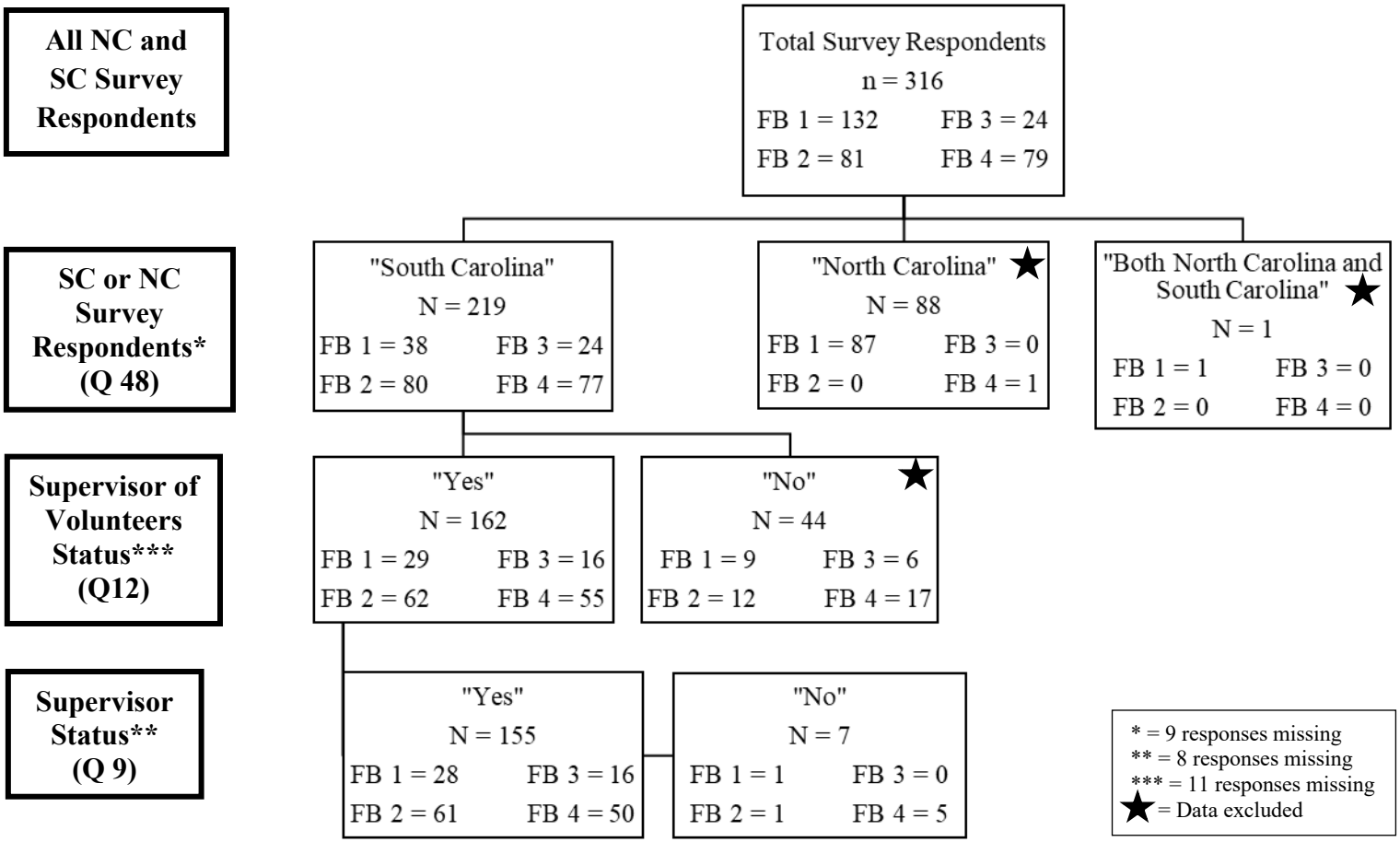

Figure B.4. Data Organization and Exclusion

Most counties served by S.C. Feeding America food banks were located in rural areas (Table 2.2). A rural area is defined by USDA through rural-urban commuting area (RUCA) codes (USDA-ERS, 2016). RUCA codes classify U.S. census tracts "using measures of population density, urbanization, and daily commuting," defining "metropolitan, micropolitan, small town, and rural commuting areas based on the size and direction of the primary (largest) commuting flows" (USDA-ERS, 2016). Areas with lower numbers are less rural and census tracts with a RUCA code of 4 to 10 are considered rural (The Office of Rural Health Policy, 2016). For the purposes of this research, counties with more than five U.S. census tracts considered rural were included in the rural county count (The Office of Rural Health Policy, 2016). Rural areas are associated with food insecure populations (Feeding America, 2018a). The average food insecurity rates for rural counties in S. C. (Abbeville, Allendale, Bamberg, Barnwell, Beaufort, Cherokee, Chesterfield, Clarendon, Colleton, Darlington, Dillon, Georgetown, Greenwood, Hampton, Kershaw, Lancaster, Laurens, Lee, Marion, Marlboro, McCormick, Newberry, Oconee, Orangeburg, Union, Williamsburg) is higher (16.8%) than the national average of 12.7% (Coleman-Jensen et al., 2018; Feeding America, 2018a).

All aspects of food pantry operation and organization varied from pantry to pantry. Previous research reported that food pantries varied widely in their operation (operating hours and days, resources available, facility space, paid versus volunteer staff per shift etc.), supervisor characteristics (training, paid status, previous education, food safety and nutrition knowledge, etc.), volunteer organization (training, shift length,

average length of service, roles and responsibilities, etc.) and volunteer characteristics (average age of volunteer, education, food safety and nutrition knowledge, etc.) (Chaifetz and Chapman, 2015). While the variability among food pantries stems from the community and clients they serve, it can make it difficult to find commonalities. Governing organizations like *Feeding America* and food banks create commonalities between food pantries due to their required policies and procedures for membership. A few of these commonalities include a working refrigerator, freezer and thermometer, yearly food safety education and at least one person who has taken the *ServSafe* food handling course.

Table 2.2. Characteristics of Feeding America Food Bank Service Areas

Food Bank	*Food Bank 1**	*Food Bank 2**	*Food Bank 3*	*Food Bank 4*
Rural counties* served (%)	60.0%	63.6%	50.0%	55.0%
Average food insecurity rate in all counties served (%)**	12.8%	15.7%	15.6%	16.5%
Total number of S.C. respondents***	38	80	24	77

* = "Rural counties" includes non-Metro counties (rural) and Metropolitan counties containing over 5 Census Tracts considered rural of the counties served in SC as described by the Office of Rural Health Policy (The Office of Rural Health Policy, 2016).
** = Average "food insecurity rate" for each county as defined by Feeding America, rounded to one decimal (Feeding America, 2019a).
*** = Respondents represented in study, excluding respondents that stated they served pantries in North Carolina.

Food Pantry Organization

According to the respondents, 84% of the food pantries represented in this survey had between one and three supervisors that worked at the pantry (Table 2.3). Shifts at most of the pantries consisted of two or less paid staff (90.6%) with 65% of the pantries

with no paid staff per shift (Table 2.3). Most pantries had more than three volunteers per shift (81.3%) with about one-third of the pantries with more than five volunteers per shift (34.4%; Table 2.3). A majority (67.9%) of volunteer supervisors working at food pantries in S.C. are unpaid. In the study conducted by Chaifetz and Chapman (2015), they reported that 60.2% of volunteer supervisors in North Carolina were unpaid. Analyses of the data demonstrated that some food pantries used application processes for volunteers (43.4%), including criminal record screenings (23.3%), but this practice was not common among all pantries represented in the survey. These results are similar to the number of North Carolina pantries that had requirements for volunteers (27.3%), "ranging from church membership to passing a formal background check" reported by Chaifetz and Chapman, 2015. The use of sign-in sheets in this study (45.6%) was comparable to previous studies (46.6%) (Chaifetz and Chapman, 2015). Sign-in sheets were important to food pantries to determine liability.

Respondents reported that volunteers were primarily given verbal instruction (56.2%) at the food pantries, but some were given verbal and written instruction (43.4%) on various tasks in which they were assigned. Finch and Daniel (2005) reported that written instruction sets a precedent and continuity that is integral in maintaining safe food handling practices in a population that has high turnover. Volunteer tasks and instructions varied among food pantries, including client intake and order preparation/distribution (68.6%) and receiving, stocking and transferring food from donation locations (79.9%). Most volunteers obtained food from donation locations (74.7%) in their own car (74.0%) at least once a month (98.3%) and decided on the quality, or acceptability, of the goods

and whether to take them to the pantry (57.5%). These findings were similar to those reported by other researchers, with three-fourths of volunteers responsible for food intake (75%), 56.8% of volunteers driving their own vehicle to pick up food, and 86.4% of volunteers making decisions about the quality of food (Chaifetz and Chapman, 2015).

Table 2.3. Food Pantry Organization Characteristics of South Carolina Supervisors of Volunteers

Pantry characteristic	Number and percentage of pantries with the characteristic	Frequency missing*
Between one and three total supervisors at pantry	136 (84.0%)	0
Two or less paid staff per shift	145 (90.6%)	2
More than three volunteers per shift	55 (81.3%)	2
Paid supervisor of volunteers	52 (32.1%)	0
Application process	69 (43.4%)	3
Criminal record screening	37 (23.3%)	3
Use of sign-in sheet	72 (45.6%)	4
Volunteers given only verbal instruction for tasks	86 (56.2%)	9
Volunteers given both written and verbal instruction for tasks	66 (43.1%)	9
Volunteers perform client intake and order preparation/distribution	109 (68.6%)	3
Volunteers receive, stock and transfer food	127 (79.9%)	3
Volunteers pick up food	115 (74.7%)	8
Volunteers drive own vehicle to pick up food	85 (72.0%)	44
Volunteers pick up food once a month or more often	115 (98.3%)	45
Volunteers decide on quality of foods	65 (57.5%)	49

* = Missing frequencies due to unanswered questions and skip pattern of the survey.

Food Pantry Supervisor Characteristics

Supervisors of volunteers were often supervisors of the entire pantry (95.7%) and had a wide variety of responsibilities (Table 2.4). All but seven supervisors that responded to the survey (n = 162) reported that they were also supervisors of their entire pantry (n = 155; Figure B.4). Often overseeing four or more volunteers (81.9%), supervisors usually worked three years or more at their current pantry (81.9%) and one year or less at other pantries (72.2%). About one-third of supervisors reported that they had worked at their current pantry for over 10 years (28.4%). Four-fifths of supervisors had earned more than a high school diploma or General Educational Development (GED) (80%) and of those with degrees, about 20% of individuals indicated that their degree was in business or a business-related field (20.9%).

Previous research determined that approximately one-third of supervisors were trained to manage volunteers (30.7%) and about 81% of supervisors reported that they received food safety training (Chaifetz and Chapman, 2015). The results of the present study agreed with the findings reported by Chaifetz and Chapman (2015) where most supervisors were trained on personal hygiene and risk analysis (84.5%), cross-contamination and surface sanitation (91.3%) and management of volunteers on food safety topics (87.6%). Previous studies have identified limitations of current food safety trainings, which were often geared towards those who handle or prepare food at their agencies, not those who store and distribute food (Chaifetz and Chapman, 2015). Limited research has been performed on the prevalence of supervisors trained to manage volunteers on nutrition topics. During the present study, a culinary demonstration and

educational session were conducted before the survey was administered and this may have increased the number of attendees interested in nutrition. Additionally, participants stating that they had received prior nutrition management training may be superficially high (55.1%) as well due to the prior educational session.

Table 2.4. Food Pantry Supervisor Characteristics of South Carolina Supervisors of Volunteers

Pantry characteristic	Number and percentage of pantries with the characteristic	Frequency missing*
Supervisor of entire pantry	155 (95.7%)	0
Supervisor oversees four or more volunteers	131 (81.9%)	2
Supervisor worked three years or more at pantry	127 (72.2%)	0
Supervisor worked at other pantries for one year or less	108 (76.1%)	20
Supervisor education past high school or GED	128 (80.0%)	2
Supervisors with degrees in Business	23 (20.9%)	52
Supervisor received training on personal hygiene and risk analysis	136 (84.5%)	1
Supervisor received training on cross-contamination and surface sanitation	147 (91.3%)	1
Supervisors trained to manage volunteers on food safety topics	134 (87.6%)	9
Supervisors trained to manage volunteers on nutrition topics	86 (55.1%)	6

* = Missing frequencies due to unanswered questions and skip pattern of the survey.

Food Pantry Volunteer Characteristics

Data gathered corresponding to food pantry volunteer characteristics were shown in Table 2.5. Most volunteers were 41 years old or older (87.9%) and served at least four years at their current pantry (59.2%). A study by Smith et al. (2014) identified the

average volunteer service time at the Ronald McDonald House (nonprofit aiding families with children in the hospital) as around six and a half years with high variance and the average age was 49 years old, ranging from 25 to 69 years old (Smith, Sirsat and Neal, 2014).

Volunteers often had a wide variety of skill sets, life experiences and preferences (Smith et al., 2014). Food pantries often placed volunteers in specific positions, such as client reception, donation sorting or food box assembly, based on skill sets and the volunteer's preference (59.2%) but not all pantry positions were optimal. Reliability and availability were characteristics valued in a volunteer at a food pantry (93.1%) as well as the ability to follow directions (45.6%).

Table 2.5. Food Pantry Volunteer Characteristics of South Carolina Supervisors of Volunteers

Pantry characteristic	Number and percentage of pantries with the characteristic	Frequency missing*
Average age of volunteers 41 years old or older	123 (87.9%)	22
Average length of volunteer service more than four years	93 (59.2%)	5
Value preference/skill set when assigning pantry positions	91 (57.6%)	4
Reliability and availability important for volunteers	148 (93.1%)	3
Just experience important for volunteers	1 (0.6%)	2
Just ability to follow directions important for volunteers	73 (45.6%)	2
Experience and ability to follow directions important for volunteers	77 (48.1%)	2

* = Missing frequencies due to unanswered questions and skip pattern of the survey.

Food Pantry Nutrition Characteristics

Food pantry volunteer nutrition characteristics were not explored as fully as food safety characteristics for several reasons. With the current minimal research on the implementation of nutrition interventions in the food pantry setting, only general training information was requested. For the purposes of this study, only minimal nutrition food pantry supervisor characteristics were chosen to be measured. Fifty-five percent of supervisors had received training managing volunteers on nutrition topics. This statistic is around twenty percentage points lower than its corresponding food safety statistic.

Food Pantry Food Safety Characteristics

Needs assessment research in food panties indicated request for additional and on-going food safety education (Finch and Daniel, 2005; Kwon et al., 2013; Smith et al., 2014; Chaifetz and Chapman, 2015). Finch and Daniel (2005) reported that food safety training may be effective in changing food safety behaviors and knowledge of food pantry workers (Finch and Daniel, 2005). To effectively train volunteers, supervisors must understand the information and the importance of food safety. Data gathered regarding food safety operations and procedures in the surveyed food pantries were provided in Table 2.6. As mentioned earlier, almost all supervisors were trained to manage volunteers on food safety topics (87.6%), yet some respondents stated that their pantry participated in potentially hazardous food safety behaviors. Over half of supervisors stated that their pantry items were distributed past the date on the food package (63.9%) and this was similar to the number of pantries (67%) reporting similar activities in the study by Chaifetz and Chapman, (2015). Often, foods that were

distributed past their date were foods that were still safe, just past their peak quality (Chaifetz and Chapman, 2015). Baby food and infant formula were an exception because federal law prohibits sale or distribution of these foods past the date presented on the package (Chaifetz and Chapman, 2015). About one-fifth of pantries accepted home-canned foods (18.5%). Similar results were reported in previous studies where only 18% of food pantries distributed home-canned foods because of the risk of *Clostridium botulinum* growth from improper canning procedures (Chaifetz and Chapman, 2015). Food is repackaged (bulk items put into smaller quantities) at around one-third of pantries (28.0%), less than the prevalence found in previous studies (46%) (Chaifetz and Chapman, 2015). The repacking process introduced the risk of contamination, improper labelling and cross-contamination (Finch and Daniel, 2005).

Food recalls, an important safeguard to food safety in the United States, were especially important in hunger relief organizations that deal with donations and rescue food (Verpy et al., 2003; Schneider, 2012; Mousa and Freeland-Graves, 2017). Food intake and inventory systems were not always accurate or extensive enough to identify specific foods. Although nearly all pantries (98.1%) received notifications about food recalls, often through the food bank, only three-fourths of pantries had written food recall plans (72.2%). Both values were higher than those reported in previous research (receive recall information (68%) and have recall plan (60%)) (Chaifetz and Chapman, 2015). First-in-first-out systems, or systems in which the oldest food was used first, are common in all establishments that prepare, store or distribute food to reduce waste, organize food

and save time. Almost all (91.8%) pantries used a first-in-first-out system, higher than previous research (84%) (Chaifetz and Chapman, 2015).

Food safety policies, rules and procedures varied among food pantries depending on the knowledge of those who train others, typically supervisors of the pantry, and how well they enforced these guidelines. Policies on handwashing, dirty hands, being one of the most common ways food is contaminated, were in place in 90% of food pantries and followed by 96.5% of pantry workers (Finch and Daniel, 2005). Policies on worker hygiene were in place in about three- fourths of pantries (77.9%) and followed by 98.5% of pantry workers. Injury coverage policies were implemented in even less pantries, around 70 percent (70.8%) and followed by 98.2% of pantry workers.

To practice safe food handling, reliable and accurate instruments and facilities must be provided. Although the Feeding America food banks required that member pantries have working thermometers, refrigerators and freezers, some pantries still lack these items (Table 2.6). Reliable and accurate equipment reduces risk of food being in the "danger zone" of 42 to 135 degrees Fahrenheit (Chaifetz and Chapman, 2015). Contrary to previous research where Chaifetz and Chapman (2015) reported "34.3% [of pantries] lacked thermometers in each freezer and refrigerator," results of the present study demonstrated that working and accurate thermometers were in 98.4% of pantries, freezers were in 97.5% of pantries and refrigerators were in 93.2% of pantries (Chaifetz and Chapman, 2015). Because food travels through many hands, safe, clean and adequate transportation is important in transporting donations (Finch and Daniel, 2005). When volunteers with limited food safety knowledge pick up and transport food in their own

vehicles (72%), the chance of contamination increases, especially when volunteers are deciding on the quality and safety of the food (57.5%).

Table 2.6. Food pantry food safety organization characteristics of South Carolina Supervisors of Volunteers

Pantry characteristic	Number and percentage of pantries with the characteristic	Frequency missing*
Supervisors trained to manage volunteers on food safety topics	134 (87.6%)	9
Distributes past-date items	101 (63.9%)	4
Accepts home-canned foods	29 (18.5%)	4
Repackage food on-site	45 (28.0%)	1
Receives notifications about food recalls	158 (98.1%)	5
Written food recall plan	114 (72.2%)	4
Use a first-in first-out system	145 (91.8%)	4
Policies on handwashing	144 (90.0%)	2
Policies on handwashing typically followed by pantry workers	137 (96.5%)	20
Policies on worker hygiene	123 (77.9%)	4
Policies on worker hygiene typically followed by pantry workers	124 (98.4%)	36
Policies on injury coverage	109 (70.8%)	8
Policies on injury coverage typically followed by pantry workers	106 (98.2%)	54
Thermometers available and accurate	159 (98.2%)	0
Refrigerator in working condition	151 (93.2%)	0
Freezer in working condition	158 (97.5%)	0
Volunteers pick up food	115 (74.7%)	8
Volunteers drive own vehicle to pick up food	85 (72.0%)	44
Volunteers decide on quality of foods	65 (57.5%)	49

* = Missing frequencies due to unanswered questions and skip pattern of the survey.

Limitations

After exclusions of data from North Carolina pantries, a larger sample with even distribution from across the state and among food banks would be a better representation of food pantries in S.C.. The survey's skip pattern was explained in writing on the print version of the survey and electronically integrated on the online version, meaning individuals taking the online version of the survey were not aware of the skip pattern. The written version of the survey was administered at food bank sanctioned events, which could influence the respondents to answer in favor of food bank rules and regulations. For one food bank event, the online survey was "required" to attend the event, which may have led to less thoughtful responses. In the survey question determining prior training in managing volunteers on nutrition and food safety topics for supervisors, some respondents marked that they had been trained because of the nutrition and food safety information presented at the event. Similar to a study by Chaifetz and Chapman (2015), the data gathered were only a "snapshot" of the pantries that were represented, supervisors and volunteers often change or leave their positions, being replaced with individuals that may be more or less educated than their predecessors (Chaifetz and Chapman, 2015). While previous studies also measured behaviors, this study measured only the behaviors of the pantries according to the supervisors.

DISCUSSION

This study, as well as previous studies, have identified a need for relevant and useful training for food pantries who store and distribute food to decrease the prevalence

of foodborne illnesses (Finch and Daniel, 2005; Kwon et al., 2013; Smith et al., 2014; Chaifetz and Chapman, 2015). Food safety training effectiveness has been explored and shown to increase positive behaviors and knowledge (Smith et al., 2014). This study also identified a need for relevant and effective nutrition training in a food pantry setting, with intentions to improve the health of food pantry clients. Nutrition training effectiveness is less explored, mostly through single food bank or food pantry interventions examining success in increasing nutrient intake and improving health and the lives of clients (Wilson et al., 2016; Mousa and Freeland-Graves, 2018; Rowland et al., 2018; Wright et al., 2018; Long et al., 2019). The data also provided information concerning food pantry general operations and supervisor characteristics to the current literature as well as information on Feeding America food bank member food pantries. To decrease food insecurity in the U.S., which is the goal of food banks and food pantries, can be to increase the nutritional quality of the food, educate on efficient use of resources and provide nutrition education in ways that clients will appreciate. To effectively educate clients, supervisors and volunteers must have a firm grasp on the impact of nutrition education. Food safety in low income populations continues to be a concern. Given the food safety risks and attitudes of the public, and consequently the volunteer population, vulnerable, food insecure populations who frequent food pantries with inadequate policies in place for safe food are at higher risk for foodborne illness.

During the FPVT Module events, agency representatives had the opportunity to voice their concerns about the program's implementation and barriers. Many food pantries struggle to keep their doors open because they do not have enough financial and

community support, volunteers and time. Computers are not a necessity and often are not available to pantries or volunteers. While some volunteers may be able to get computer access through a local library or community center, this time is limited. Currently the program is only available online, but future directions may include placing the FPVT Modules on a digital versatile disc (DVD) or in print.

Many nutrition interventions, such as increasing fresh produce or banning soda, have been implemented in food banks and food pantries across the U.S. and world (Flynn et al., 2013; Handforth et al., 2013; Martin et al., 2013; Feeding America, 2019e; Long et al., 2019). Past research has not studied the full effectiveness of nutrition education on the behaviors of pantry supervisors, volunteers and clients. Approximately half of food pantry supervisors stated that they had not been trained to manage volunteers on nutrition topics (55.1%) and paired with the nutritional inadequacy of the food, current nutritional needs of clients may not be met by hunger relief organizations (Adobundu et al., 2004; Rowland et al., 2018; Farahbakhsh et al., 2017; Schneider et al., 2017).

Food safety starts with a safe food supply and efficient sorting with acceptance criteria for all types of food. Using volunteers to transport food in unrefrigerated, possibly dirty vehicles may increase risk of contamination of food. Three-fourths of pantries use volunteers to pick up food (74.7%) and 72% of volunteers use their own vehicles, which could have microorganisms, chemicals or other contaminants. A possible solution to this would be to provide suitable secondary containment for food and train volunteers on how to use, maintain and clean the transportation containers. Additionally, volunteers from 57.5% of pantries with minimal food safety training decided on the

quality of the goods. Volunteers may not be aware of the temperature abuse that could affect perishable foods, creating optimal conditions for microorganism growth if volunteers pick up donations from multiple locations taking hours to get back to the pantry. Donation supply cannot be controlled so appropriate sorting methods that determine safety of food in necessary, instead of relying on dates on the food, which is associated with quality more than safety (Chaifetz and Chapman, 2015). Sixty-four percent of pantries distribute food past the date on the food package (63.9%) and while some pantries have efficient sorting procedures in place, moldy, old food still makes it to the clients (Cleland, 2018). Pantries should outline criteria that looks for water, insect, rodent, spoilage and microorganism damage for each type of package, boxed, canned, bakery, produce or otherwise. Although 18.5% of pantries accept home-canned or home-processed goods, they should not be accepted by pantries due to their high risk of contamination caused by improper handling procedures. If vulnerable populations ingest even small amounts of food contaminated by botulinum toxin they would likely not survive. General food safety guidelines, such as rinsing the outside of the can before use, should be posted around the food pantry to encourage and educate clients on how to reduce the risk of foodborne illness. To educate and create criteria for the food pantries, adequate and appropriately educated food pantry supervisors are required. Approximately 12 percent of food pantry supervisors stated they had not received any training to manage volunteers on food safety topics, and the same number of supervisors had not received training on personal hygiene, risk analysis, cross-contamination and surface sanitation.

Having an educator that understands the importance of food safety and how it especially affects clients can inspire food pantry workers to handle food safely.

Once food enters the food pantry and is sorted, it can still become contaminated by the environment or workers. Insufficient cleaning and sanitation practices in the pantry, improper cleaning or inadequate storage can immensely affect the safety of food in the pantry. In the study by Chaifetz and Chapman (2015), supervisors mentioned that the food safety trainings were "geared towards food handling and preparation rather than storage" and only required by food banks if the agency served food (Chaifetz and Chapman, 2015). Food may become contaminated by food pantry workers through poor hygiene or unsafe food handling practices. Around one-fourth of pantries do not have any policies on worker hygiene (22.1%) and 30% of pantries do not have any policies on injury, wound and scab coverage (29.2%). Skin and blood carry bacteria, viruses and diseases that can easily be transferred to food and food contact (Chaifetz and Chapman, 2015). Adequate handwashing policies, absent in 10% of pantries, has been estimated to "reduce diarrheal illness in people with weakened immune systems by 58% and the number of people who become sick by 31%" (Chaifetz and Chapman, 2015). Pantries who engaged in behaviors that increase risk of contamination, such as repackaging (28% of pantries), may introduce another opportunity for contamination of food if the utensils they are using are dirty or if pantry workers have poor personal hygiene. Recalls may also present contamination in the pantry after the food is received if it is not properly disposed. Recall information, received by almost all pantries (98.1%), is only used by 72.2% of the pantries in a food recall plan, or a plan to limit the ingestion of the recalled

food. Food is recalled for allergen mislabeling, foodborne illness outbreaks and manufacturer recalls (USDA-FSIS, 2019). While exceedingly difficult to recall food that leaves the pantry with clients, pantry supervisors can remove the recalled food from the pantry, post recall information in client areas and alert clients who may have brought the food home (Chaifetz and Chapman, 2015). Without a written recall plan, future supervisors or volunteers may not know how to proceed.

Food pantry staffing and operations were surveyed to determine efficient training methods. Supervisors overseeing volunteers often were supervisors of the entire pantry (95.7%) suggesting that supervisor time is often split between varying responsibilities. Supervisors usually oversee four or more volunteers, meaning volunteers should be autonomous after their initial training. Supervisors usually served three or more years and stay at the same pantry for their entire volunteer service (72.2%), serving less than a year at other pantries (76.1%). The need for training that covers all food safety and nutrition concerns without using the time of a supervisor could alleviate some of the burden from supervisors.

Future Directions

Generally, research should be continued determining the impact of nutrition on human health and wellbeing. In a food pantry setting, the nutritional composition of available foods should be evaluated as well as deficiencies that may occur in clients primarily consuming food pantry groceries. Research on food insecurity, specifically how it affects individuals mentally, physically and emotionally should be continued. Additionally, research should be performed on the impact of resource-use education on

the behavior change of individuals. Research should continue to examine the impact of the FPVT Modules and collect data through built-in pre-/post-tests. The FPVT Modules should be reviewed and revised as new information is discovered, as well as updated with additional training topics. The FPVT Modules could also be distributed in print or on a digital versatile disc (DVD). Future additional training topics could include how to create food lists for donors, examples of food boxes for specific diets, resources for food donors related to home canning techniques and specific examples of nudges that can be used in the food pantry setting.

In addition to the data gathered by the Food Pantry Supervisor Survey, more data could be gathered using an open-ended interview style survey, examining choices that clients make in a food pantry and grocery store setting and gathering information through observations in food pantries. Research could focus on the effect of pantry structure, volunteer management strategies, and nutrition and food safety education delivery methods.

CONCLUSION

The objectives of this study were to: 1) determine nutrition and food safety educational needs of food pantry volunteers in South Carolina, 2) identify commonalities in policies, procedures and practices among food pantries in South Carolina, 3) identify commonalities in characteristics of South Carolina food pantry supervisors and volunteers and 4) develop and deliver a training curriculum for South Carolina food pantry volunteers. This study determined operations in food pantries rely heavily on

volunteers, especially regarding food safety concerns, and volunteers have a large impact on those they serve. Most volunteers are responsible for picking up food, determining quality and safety of the food and receiving, stocking and transferring food from donation location to pantry (Chaifetz and Chapman, 2015). These tasks are areas where contamination could be introduced. Inadequate food safety practices introduce opportunities for food to be contaminated. Current food safety education in hunger relief organizations, while usually required, lacks some aspects of food sorting and storage and may be geared toward food preparation (Chaifetz and Chapman, 2015). Another weakness found by Chaifetz and Chapman (2015) and corroborated by this study was the lack of food recall plans (Chaifetz and Chapman, 2015). Chaifetz and Chapman (2015) mentioned most food pantries associated with a food bank received recall information from the food bank (Chaifetz and Chapman, 2015). Of those surveyed in this study, almost all pantries received notifications about food recalls but only three-fourths of the pantries had food recall plans. Recalled food is potentially contaminated, either by adulteration, mislabeling or pathogen contamination. With no written recall plan, new supervisors may struggle reaching clients, organizing the removal of recalled food or where to post the recall information.

Nutrition education is less widespread, approximately half of supervisors were not trained to manage volunteers on nutrition topics. Improving nutrient intake through subtle changes in the environment or classes can improve the health of clients (Wilson, 2016; An et al., 2019). Supervisors usually are the point of contact for donors, oversee multiple volunteers and supervise pantry operations. Some supervisors were unpaid

volunteers and may have a job or other responsibilities, meaning their time is limited even when they may have increasing responsibilities as supervisors. As food pantries and food banks continue to increase intake of fresh fruits and vegetables, education on how to safely consume and use this produce may be necessary. Fresh, whole produce may be unfamiliar or overwhelming to those who may not have the instruments to process the produce. Volunteer education on necessary temperature control for storage of perishable goods, regardless of information trickle down to clients, is essential to safe food handling.

Educating volunteers or those who encounter clients is an important step in changing food safety and nutrition behaviors in food pantries. Past research has determined that the general population, thus volunteers at food pantries, lack knowledge about preventing foodborne illness when handling food (Finch and Daniel, 2014). Temperature control, proper hygiene and adequate sanitation were three of the main areas of concern in populations that handle food (Finch and Daniel, 2014). Given that volunteers transport, sort and store foods, a full knowledge of safe food handling is preferred to distribute food safe enough for the vulnerable client population. Nutrition education is less common, often not required by food banks. This study determined over half of pantry supervisors had no training on how to educate and manage volunteers regarding nutrition topics. The general population often has no food safety knowledge (40%), does not remember to implement what they have learned (40%) or choose to ignore safe food handling techniques entirely (Smith et al., 2014). Clients usually obtain nutrition advice from friends, parents, families, cookbooks, magazines, the internet, community programs and government assistance programs (Hoisington et al., 2002).

Clients expressed interest in “shopping and stretching food dollars,” “cooking and making tasty, low-cost food,” “healthful foods and nutrition” and “feeding kids and getting them to eat” (Hoisington et al., 2002). Some individuals received minimal nutrition education in the early years of school if they attended but not to the extent that would be useful in a pantry setting. Increasing the nutrient intake even a small amount could improve the lives of clients by improving their health. Education on special diets and foods that fit into these diets could be especially helpful for those with diseases requiring a special diet. Some food banks and food pantries have implemented nutrition initiatives in the form of nutrition nudges, classes, grocery store tours and other ancillary services (Flynn et al., 2013; Martin et al., 2013; Feeding America, 2019c; Feeding America, 2019d). Of the outcomes studied from these interventions, most were positive testing short-term results (Flynn et al., 2013; Martin et al., 2013; Remley et al., 2013; Wilson, 2016; Long et al., 2019).

While nutrition and food safety education may not be the only solutions to the problems of food insecurity and foodborne illness respectively, education may help pique interest in learning to improve the quality of peoples’ lives. Hunger relief organizations have many responsibilities to their clients, first and foremost offering nutritionally adequate, safe food in sufficient quantities. Organizations like Feeding America have continuously improved their systems and researched how to reduce hunger in populations that have been heavily affected (Feeding America, 2018a). As shown in the research, supervisors have many responsibilities and limited time to train new volunteers, especially high numbers of volunteers. The results from this study can be used to further

define characteristics of food pantry supervisors, volunteers and pantry operations to customize training and education in the future. Research is meant to incite change or promote knowledge, whether through interest in the subject of the research, policy change or through other avenues.

APPENDICES

Appendix A

Definitions of Food Security, Food Insecurity, Hunger, Malnutrition and Poverty among Selected Publications

Table 2.7. Definitions of Food Security among Selected Publications

Word	**Citation**	**Definition**
Food security	National Research Council (NRC), 2006	"(a) the ready availability of nutritionally adequate and safe foods; and (b) an assured ability to acquire acceptable foods in socially acceptable ways"
Food security	Coleman-Jensen et al., 2018	"consistent, dependable access to enough food for active, healthy living"
Food security	Food and Agricultural Organization of the United Nations (FAO), 2008	"Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life"
Food security	USDA-ERS, 2018c	"Food security for a household means access by all members at all times to enough food for an active, healthy life" *and* "The ready availability of nutritionally adequate and safe foods" *and* "Assured ability to

		acquire acceptable foods in socially acceptable ways (that is, without resorting to emergency food supplies, scavenging, stealing, or other coping strategies)"
High food security	USDA-ERS, 2018b	"no reported indications of food-access problems or limitations"
Marginal food security	USDA-ERS, 2018b	"one or two reported indications – typically of anxiety over food sufficiency or shortage of food in the house" *and* "little or no indication of changes in diets or food intake"

Table 2.8. Definitions of Food Insecurity among Selected Publications

Word	**Citation**	**Definition**
Food-insecure households	USDA-ERS, 2016	"households with difficulty at some time during the year providing enough food for all their members due to a lack of resources"
Food insecurity	Coleman-Jensen et al., 2018	"access to adequate food is limited by a lack of money and other resources"
Food insecurity	Feeding America, 2018b	"The household-level economic and social condition of limited or uncertain access to adequate food. It is assessed in the Current

		Population Survey and represented in USDA food-security reports." *and* "lack of available financial resources for food at the level of the household"
Child food insecurity	Feeding America, 2018b	"The household-level economic and social condition of limited or uncertain access to adequate food, as reported for households with children under age 18; it is assessed in the Current Population Survey (CPS) and represented in U.S. Department of Agriculture (USDA) food security reports."
Low food security	USDA-ERS, 2018b	"reports of reduced quality, variety, or desirability of diet" and "little or no indication of reduced food intake"
Very low food security	USDA-ERS, 2018b	"reports of multiple indications of disrupted eating patterns and reduced food intake"
Transitory food insecurity	Food and Agricultural Organization of the United Nations (FAO), 2008	"short-term... sudden drop in the ability to produce or access enough food to maintain a good nutritional status"
Chronic food insecurity	Food and Agricultural Organization of the United	"people are unable to meet their minimum food

	Nations (FAO), 2008	requirements over a sustained period of time"
Child food insecurity rate	Feeding America, 2018b	"The percentage of children living in households in the U.S. that experienced food insecurity at some point during the year. The child food-insecurity estimates in this study are derived from the same questions used by the USDA to identify food insecurity in households with children at the national level."
Food insecurity rate	Feeding America, 2018b	"The percentage of the population that experienced food insecurity at some point during the year."

Table 2.9. Definitions of Hunger among Selected Publications

Word	**Citation**	**Definition**
Hunger	USDA-ERS, 2018b	"individual-level physiological condition that may result from food insecurity"
Hunger	Holden, 2005	"1) a motivational drive, need or craving for food; 2) an uneasy sensation felt when one has not eaten for some time; 3) discomfort, illness, weakness or pain caused by a prolonged involuntary lack of food; and 4) the prolonged, involuntary lack of food

		itself”
Hunger	USDA-ERS, 2018c	"the uneasy or painful sensation caused by lack of food"
Resource-constrained hunger	USDA-ERS, 2018c	"... a potential consequence of food insecurity that, because of prolonged, involuntary lack of food, results in discomfort, illness, weakness, or pain that goes beyond the usual uneasy sensation”
Hunger	Feeding America, 2019a	“a personal, physical sensation of discomfort”
Hidden hunger	Tanumihardjo et al., 2007	“When an individual suffers from subclinical nutrient deficiencies (eg. iron, folic acid, and vitamin A), but does not have overt clinical signs of undernutrition.”
Hunger	Food and Agricultural Organization of the United Nations (FAO), 2019	“chronic undernourishment”

Table 2.10. Definitions of Malnutrition among Selected Publications

Word	**Citation**	**Definition**
Malnutrition	Food and Agricultural Organization of the United Nations (FAO), 2008	“deficiencies, excesses or imbalances in the consumption of macro- and/or micro-nutrients”
Malnutrition	Academy of Nutrition and Dietetics (AND), 2017	“inadequate intake of nutrients, particularly protein over time, and may contribute to, chronic illness, and acute disease or illness and

		infection”
Malnutrition	Johns Hopkins Medicine, 2019	“condition that develops when the body is deprived of vitamins, minerals and other nutrients it needs to maintain healthy tissues and organ function”
Undernutrition	Johns Hopkins Medicine, 2019	“occurs when not enough essential nutrients are consumed or when they are excreted more rapidly than they can be replaced”
Undernutrition	Food and Agricultural Organization of the United Nations (FAO), 2018	“[individuals] whose dietary energy consumption is less than a pre-determined threshold… [and] suffering from food deprivation”
Overnutrition	Johns Hopkins Medicine, 2019	“occurs in people who eat too much, eat the wrong things, don't exercise enough or take too many vitamins or other dietary replacements”

Table 2.11. Definitions of Poverty among Selected Publications

Word	**Citation**	**Definition**
Poverty	United States Census, 2019	“[Determination of poverty] uses a set of money income thresholds that vary by family size and composition... If a family's total income is less than the family's threshold, then that family and every individual in it is considered in

		poverty”
Poverty	Food and Agricultural Organization of the United Nations (FAO), 2018	“Poverty encompasses different dimensions of deprivation that relate to human capabilities including consumption and food security, health, education, rights, voice, security, dignity and decent work”

Appendix B

History and Influence of Government Food and Nutrition Programs (FANPs)

The National School Lunch Act, passed in 1946, was the first act that permanently delegated aid towards the health and nutrition of school age children through school lunch programs and, like many other government food assistance and nutrition programs, after many years has morphed into the National School Lunch Program (NSLP) that exists today (Gunderson, 1971; Fox et al., 2004). NSLP serves free and reduced-price nutritionally-adequate meals and snacks to over 30 million school-aged children at over 100,000 public and private schools as well as childcare institutions each day (Fox et al., 2004; USDA, 2017; Coleman-Jensen et al., 2018). Of all lunches served in U.S. elementary and high schools in 2017, 67% were free and 7% were reduced-price lunches (Coleman-Jensen et al., 2018). NSLP, along with other child nutrition programs including Fresh Fruit and Vegetable Program, School Breakfast Program, Special Milk Program and Summer Food Service Program all serve school-aged children, providing them nutritionally adequate meals and snacks all year long (Fox et al., 2004). The Fresh Fruit and Vegetable Program provides fresh fruits and vegetables as snacks throughout the day, introducing new varieties, increasing acceptance and promoting nutrition education (USDA, 2017a). The School Breakfast Program works similarly as the National School Lunch program, providing free and reduced-price breakfast following nutrition standards to 14.57 million school-aged children (Fox et al., 2004; USDA, 2017b). The Special Milk Program offers half-pints of milk to school-aged children in over 4,000 schools and residential child care facilities who do not participate in National

School Lunch or Breakfast Programs (Fox et al., 2004; USDA, 2012). While the National School Lunch and Breakfast Programs operate during the school year, the Summer Food Service Program operates during the summer in approved feeding sites, offering free meals and snacks to low-income school-age children (Fox et al., 2004). The Child and Adult Care Food Program feeds nutritious meals and snacks to children and adults in nonresidential adult and child day care centers, homeless shelters and after school programs (Fox et al., 2004). The Child and Adult Care Food Program serves nutritious snacks and meals to over 3.3 million children and 120,000 adults each day (USDA-FNS, 2019b; Fox et al., 2004).

While most FANPs are geared towards the nutrition of school-aged children, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides food, education and resources to pregnant, nursing and postpartum women as well as children under the age of 4 (Fox et al., 2004). WIC has one of the highest thresholds at 185% of the poverty threshold, meaning more individuals can be eligible for this program (Fox et al., 2004). WIC benefits provide "supplemental foods, nutrition education, and referrals to health care and social services" to approximately 7.3 million pregnant to postpartum women and children nationally and about 92,000 in S.C. (Fox et al., 2004; Coleman-Jensen et al., 2018; WIC, 2019). WIC participants can purchase authorized foods, such as infant and baby food, soy-based beverages, peanut butter, eggs, whole wheat bread and other foods rich in iron, protein and calcium using electronic benefit transfer (EBT) (USDA-FNS, 2018a). The WIC Farmers' Market Nutrition Program, another feature available to WIC eligible participants, supplies WIC

participants with fresh vegetables, fruits and herbs from local farmers at farmers' markets, roadside stands and on-site (USDA, 2018). This program is also offered to seniors over the age of 60, through the Senior Farmers' Market Nutrition Program (USDA, 2018).

The Supplemental Nutrition Assistance Program (SNAP) is the largest hunger relief program serving over 45 million individuals in low-income households, offering them the ability to use electronic benefits to buy food to consume in the home from SNAP-authorized retailers (Fox et al., 2004; USDA, 2012). Using a debit-like card, SNAP eligible individuals can purchase food including breads, cereals, fruits, vegetables, meats, fish, poultry, dairy products and seeds (USDA-FNS, 2017; USDA-FNS, 2019b). Nationally, SNAP benefitted on average 42.2 million individuals a month, about 13% of the U.S. population (Coleman-Jensen et al., 2018). Out of about 4.8 million individuals in S.C. in 2018, 883,000 individuals were eligible for SNAP benefits (above 130% poverty line) and approximately 80% of these individuals participated in SNAP benefits (USDA, 2019a). Nationally, S.C. is ranked 39th in participation in SNAP among eligible individuals (USDA, 2019a). Possible barriers to participation among eligible individuals will be discussed in the next section.

USDA food distribution programs like the Commodity Supplemental Food Program (CSFP), Food Distribution Program on Indian Reservations (FDPIR) and The Emergency Food Assistance Program (TEFAP) use private and non-profit organizations like food pantries and food banks to distribute food and meals to those in need (Fox et al., 2004; USDA-FNS, 2018b). For the Commodity Supplemental Food Program, state agencies

"determine the eligibility of applicants, distribute the foods, and provide nutrition education" to seniors over 60 years old and "provide referrals to other welfare, nutrition, and healthcare programs, such as WIC, SNAP, Medicaid, and Medicare" (USDA-FNS, 2018b). The Food Distribution Program of Indian Reservations provides the same resources as the Commodity Supplemental Food Program, but to all low-income households on American Indian reservations (Fox et al., 2004). Like the Commodity Supplemental Food Program, The Emergency Food Assistance program also uses public and private nonprofit organizations to distribute their food, but recipients must be deemed eligible by the state (USDA-FNS, 2017).

Appendix C

Preliminary Data from In-Person Interview with FB Directors

Table 2.12. Preliminary Data from In-Person Interview with FB Directors

Characteristics	**Food Bank 1**	**Food Bank 2**	**Food Bank 3**	**Food Bank 4**
Educational Training	Annual training in September for two and a half days	Annual training	Food bank has annual conference in August, focusing on management of volunteers	Annual training in September
	Require *ServSafe* training for food pantries		Food bank requires food safety training (*ServSafe*) training every 2 years	Member food pantry volunteers required to watch 45 minute training video (history of food bank, volunteer training, food safety and hygiene)
	At least 1 person trained in food safety per food pantry		Food bank wants donor training with incentives to donate fresh foods to food bank	Food bank wants quick high point video instead of 45 minute training video
	At least one person from each member food pantry must be trained on how to shop at food bank		Food bank wants video modules for member food pantries based on guidelines from Feeding America	
	Training for		Food bank	

	food pantry shoppers every 3rd Thursday		wants more programs for member food pantry supervisors	
Food Bank Advisory Board		Food bank has advisory board with member food pantry representatives to voice their concerns	Food bank created counsel of 11 member food pantries	
Food Bank Donations	Walmart and CVS donate non-food items	Food banks use can drives		
	Receive 40% of rescue food from grocery stores	Food bank receives donations from the South Carolina Deer Association		
	Receive lots of eggs, canned food, frozen chicken for TEFAP agencies			
Food Bank General Operations	Food bank open 2 times a week	Most member food pantries a hybrid version of client choice and pre-made bags	Survey and Feeding America membership renewal annually	Feeding America inspects paperwork, 3rd party inspects warehouses for food bank
	Monday is reserved for shoppers from the food pantry			Member food pantries have over 6,500 volunteers
	For most member food pantries, clients visit monthly or every 2 weeks			

Food Bank Food Safety Operations	In food bank or food pantries, no food is repackaged, no open packages accepted	No home canned food or canned baby food accepted in food bank or food pantry		
	Fresh produce that is received is sorted and put into grocery bags	Infant formula thrown out when out of date in food pantries		
		Thermometers checked 2 times a week at food pantries		
Food Bank Nutrition Operations			Food bank initiatives focusing on foods to eat (F2Es) by Feeding America	Food bank has not had any luck with Cooking Matters program (some recipes had spices unavailable to clients)
			Food bank offers grocery store tours to food pantry clients	Insufficient storage for fresh produce that is received
			Mentions concern about weight of healthy foods vs. unhealthy foods, pantries get more food when they choose unhealthy options	Food bank employee creates nutrition education fact sheets with puzzles and games to create interest
			Need to make food boxes based on	Food bank created template for 5

			chronic diseases, 42% of clients have diabetes	different boxes with health in mind (cancer, diabetes, heart disease, hypertension, etc.)
			Food bank has healthy guidelines for food pantries, how to make options healthier	Food bank created shelf stable boxes with tips on special diets, how to reduce salt and sugar and other heathy tips
				Food bank piloting program that supports those with type 2 diabetes mellitus
Food Bank Programs	Serve about 60 member food pantries that are eligible for TEFAP	Food bank concerned with majority of volunteers "aging out" of volunteer positions		Food bank has a mobile application that is used by 60-70% of member food pantry volunteers
	Food bank administers surprise visit to food pantries every 9 months	Food bank wants more opportunities for paid internships		
	80% of member food pantries are faith-based			
	Follows USDA laws against to prevent holding food hostage			

	Food bank struggles with balance of food			
Educational Training Needs	How to recruit volunteers, how to fundraise, how to manage volunteers (managing schedules of different volunteers), how to create accountability, how to create job descriptions	Proper sorting, date checking (volunteers confused by codes vs. dates), how to effectively use client choice pantry setup, how to get rid specific foods (dried beans, eggplant, venison, etc.)	Volunteers need more nutrition education, cultural sensitivity training, task-oriented training, produce safety rule training, time management, impact of education on clients	Volunteers need short video that covers all required information for quick orientation training

Commonalities Between FB	
• Require yearly food safety training • Served individuals eligible for The Emergency Food Assistance Program (TEFAP)	• Barriers for food pantries: volunteers have no nutrition education, lack of volunteers with transportation to get to panty and pick up donations, restrictions from location, lack of volunteers with time management skills, lack of manpower, lack of community support, lack of reliable equipment (coolers, freezers, etc.), lacking openness to new ideas

Appendix D

Food Pantry Supervisor Survey

Food Pantry Supervisor Survey

1. How many managers/supervisors work at your current pantry in total?
    a. 1 to 3
    b. 4 to 6
    c. 7 to 9
    d. 10 or more
    e. I don't know
2. Is your position at the pantry a paid or volunteer position?
    a. Paid
    b. Volunteer
3. How many years have you worked at the pantry?
    a. 1 year or less
    b. More than 1 year to 3 years
    c. More than 4 years to 6 years
    d. More than 7 years to 9 years
    e. More than 10 years
4. How many years have you worked at pantries other than this pantry?
    a. 1 year or less
    b. More than 1 year to 4 years
    c. More than 4 years to 7 years
    d. More than 7 years to 10 years
    e. More than 10 years
5. Have you received training on any of the following food safety or food handling topics?
    a. Personal hygiene – proper handwashing, body washing and facial cleanliness

b. Risk analysis (assessment, management, communication) – increased awareness and management of the risks and hazards that may increase the spread of foodborne disease
c. Both A and B
d. Neither A nor B

6. Have you received training on any of the following food safety or food handling topics?
    a. Cross-contamination – the act of spreading bacteria and viruses from one surface to another, specifically between raw meats, dairy and vegetables
    b. Surface sanitation – proper cleaning of food preparation and non-food surfaces to decrease spread of foodborne disease
    c. Both A and B
    d. Neither A nor B
7. What is the highest level of education you have completed?
    a. Less than 8th grade
    b. 9th to 12th grade
    c. Some college/Associate's Degree
    d. Bachelor's Degree
    e. Post-Graduate Degree

**** IF NOT A COLLEGE GRADUATE, PLEASE SKIP TO QUESTION 9 ****

8. If college graduate, what was your major of your highest degree?
    a. Fine Arts/Language
    b. Science/Technology/Engineering/Math
    c. Business
    d. Social Sciences
    e. Other
9. Are you the manager/supervisor of the food pantry?
    a. Yes
    b. No
10. On a typical day, how many paid staff are there per shift?
    a. 0
    b. 1 to 2

c. 3 to 4
d. 4 to 5
e. More than 5

11. On a typical day, how many volunteer staff are there per shift?
    a. 0
    b. 1 to 2
    c. 3 to 4
    d. 4 to 5
    e. More than 5
12. Are you the manager/supervisor of volunteers at the pantry?
    a. Yes
    b. No

**** IF YOU DO NOT MANAGE/SUPERVISE VOLUNTEERS, PLEASE SKIP TO QUESTION 33 ****

13. If yes, how many volunteers do you typically manage?
    a. 1 to 3
    b. 4 to 6
    c. 7 to 9
    d. 10 or more
14. Were you trained to manage the volunteers on food safety topics?
    a. Yes
    b. No
    c. I don't know
15. Were you trained to manage the volunteers on nutrition topics?
    a. Yes
    b. No
    c. I don't know
16. Is there an application process for volunteers?
    a. Yes
    b. No
    c. I don't know
17. Do you have a criminal record screening process to become a volunteer?
    a. Yes

b. No
c. I don't know

18. How are volunteers assigned to food pantry positions?
    a. Age
    b. Education
    c. Preference/skill set
    d. Length of service with pantry
    e. Other
19. Which of the following characteristics do you consider important for potential volunteers?
    a. Reliability
    b. Availability
    c. Both A and B
    d. Neither A nor B
20. Which of the following characteristics do you consider important for potential volunteers?
    a. Experience
    b. Ability to follow directions
    c. Both A and B
    d. Neither A nor B
21. Do volunteers sign in when they arrive for their shift?
    a. Yes
    b. No
    c. I don't know
22. Select the age range of most of the volunteers at the pantry.
    a. Less than 20 years old
    b. 20 to 40 years old
    c. 41-60 years old
    d. 61-80 years old
    e. More than 80 years old
23. How long (in years) do most volunteers stay?
    a. 1 year or less
    b. More than 1 year to 3 years
    c. More than 4 years to 6 years
    d. More than 7 years to 9 years

e. More than 10 years

24. Which of the following are tasks volunteers are asked to do?
    a. Client intake
    b. Order preparation/order distribution
    c. Both A and B
    d. Neither A nor B
25. Which of the following are tasks volunteers are asked to do?
    a. Receiving and stocking food
    b. Food transfer from donation locations to pantry
    c. Both A and B
    d. Neither A nor B
26. Are there written descriptions for different volunteer positions?
    a. Yes
    b. No
    c. I don't know
27. Are the volunteers given instruction on their designated task?
    a. Yes
    b. No
    c. I don't know

**** IF VOLUNTEERS ARE NOT GIVEN INSTRUCTION, PLEASE SKIP TO QUESTION 29 ****

28. If yes, what form of instruction are volunteers given on their designated task?
    a. Verbal
    b. Written
    c. Both verbal and written
29. Do volunteers pick up food donations/food bank items from retailers or the food bank?
    a. Yes
    b. No

**** IF VOLUNTEERS DO NOT PICK UP FOOD DONATIONS/FOOD BANK ITEMS, PLEASE SKIP TO QUESTION 33 ****

30. If yes, do volunteers drive their own vehicle to pick up food donations/food bank items?

a. Yes
b. No

31. If yes, how often do volunteers pick up food donations/food bank items?
    a. More than once a week
    b. Once a week
    c. Once every 2 weeks
    d. Once a month
    e. Less than once a month
32. If yes, are the volunteers responsible for deciding on the quality of the goods – if worth taking?
    a. Yes
    b. No
    c. I don't know
33. Do you distribute food past the date on the package?
    a. Yes
    b. No
    c. I don't know
34. Do you accept home-canned food?
    a. Yes
    b. No
    c. I don't know
35. Do you receive notifications about food recalls?
    a. Yes
    b. No
    c. I don't know
36. Do you have a food recall plan or **written** instructions for what to do with recalled food?
    a. Yes
    b. No
    c. I don't know
37. Do you use place food on the shelf with the oldest date at the front and the more recent date at the back?
    a. Yes
    b. No

c. I don't know

38. Is food repackaged at the pantry?
    a. Yes
    b. No
    c. I don't know
39. Does the pantry have policies, procedures or rules about handwashing?
    a. Yes
    b. No
    c. I don't know

**** IF YOU ANSWERED "NO" OR "I don't know" FOR QUESTION 39, PLEASE SKIP TO QUESTION 41 ****

40. If yes, do you and others typically follow these policies, procedures or rules about handwashing?
    a. Yes
    b. No
    c. I don't know
41. Does the pantry have policies, procedures or rules about worker cleanliness/clean clothes?
    a. Yes
    b. No
    c. I don't know

**** IF YOU ANSWERED "No" OR "I don't know" FOR QUESTION 41, PLEASE SKIP TO QUESTION 43 ****

42. If yes, do you and others typically follow these policies, procedures or rules about worker cleanliness/clean clothes?
    a. Yes
    b. No
    c. I don't know
43. Does the pantry have policies, procedures or rules about wound/scab/injury coverage?
    a. Yes
    b. No
    c. I don't know

**** IF YOU ANSWERED "No" OR "I don't know" FOR QUESTION 43, PLEASE SKIP TO QUESTION 45 ****

44. If yes, do you and others typically follow these policies, procedures or rules about wound/scab/injury coverage?
    a. Yes
    b. No
    c. I don't know
45. Does the pantry have a thermometer in working condition that is used for client food?
    a. Yes
    b. No
    c. I don't know
46. Does the pantry have a refrigerator in working condition that is used for client food?
    a. Yes
    b. No
    c. I don't know
47. Does the pantry have a freezer in working condition that is used for client food?
    a. Yes
    b. No
    c. I don't know
48. Is the pantry/pantries in which you work in North Carolina, South Carolina or both?
    a. North Carolina
    b. South Carolina
    c. Both North Carolina and South Carolina
    d. Neither North Carolina nor South Carolina

Figure B.5. Food Pantry Supervisor Survey

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