Moving Beyond a Clinical Setting to Reduce Health Disparities: A Food Pantry Approach to Improve Health and Wellness Among Food Insecure Populations

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Abstract

Backgrounds/Significance. Many Americans face difficulty in attaining food and adequate nutrition on a daily basis. Research has shown that social determinants play a large role in health outcomes, with food insecurity (FI) being one of the largest contributors to poor management of chronic disease and increased healthcare costs. Traditional healthcare approaches have a limited access to the FI population, as healthcare access and utilization in this population is complicated by lack of income, insurance, and other competing factors. Purpose/Methods. By leveraging the food pantry's access to this vulnerable population for health promotion, the severity of FI was evaluated among three food pantries in a small community in Virginia and the feasibility and the effectiveness of the combined education of healthy diet and community resources was evaluated using a using a pretest-posttest design among adults who visited one of three food pantry. Findings. This study observed that higher levels of FI were strongly connected with lower income ($p=0.044$) and higher frequencies of food/medication trade-offs ($p= 0.01$) among the study sample (N=40). This study's educational intervention utilizing *MyPlate* among this food pantry populace proved to be a successful and feasible method of health promotion, improving overall knowledge of *MyPlate* initiatives (6.45 vs. 10.05, $p<0.001$) and overall confidence in reading food labels and ability to prepare healthy meals on a $4 budget (4.375 vs. 5.7, $p<0.001$). The resource education intervention also improved overall awareness (19.75 vs. 52.3, $p=0$) with strong evidence of user intention to use newly found resources (2.375 vs 10.425, $p=0$). Conclusions. By moving health promotion strategies from the traditional clinical setting to community settings such as food pantries, nurse practitioners and other health professionals can expand their reach into highly vulnerable populations. It is essential to leverage the relative

strengths of both the traditional approach and alternative community settings for improving health outcomes for food insecure populations.

Keywords: food insecurity, food pantry, food bank, chronic diseases, diabetes, high cholesterol, hypertension, cardiovascular disease, intervention, diet education, nutrition program, health outcomes.

Dedication

This project was made possible and is dedicated to the one who deserves all the praise- my Lord and Savior, Jesus Christ. I would also like to dedicate this work to my husband, who encouraged me to start this journey, made immense sacrifices to ensure my success, believed in me and loved me unconditionally-despite the numerous episodes of sleepless nights, self-doubt, mood swings and meltdowns. To my Doodles, Luna and Penny-the happiness and joy found in the most stressful time of my life. To my daughter, the inspiration to every aspect of my life. To my parents, who see no boundaries when they look at me-calling me "Dr. Misty Spring Queen" since day one. While they may not comprehend the education nor the degree- they know the obstacles that I have overcome, are the very ones that have held them hostage to the demands of a poverty-stricken legacy. Mom, Dad thanks for giving me your everything-the journey of reaping the rewards for those sacrifices have just begun.

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Chapter 1: Introduction

The United States (US) is known for being economically abundant and often referred to as the "land of plenty." Yet one out of eight Americans (40 million out of 329 million Americans) are going hungry and suffering from illnesses because they do not have sufficient food (United States Department of Agriculture [USDA], 2018). While hunger plays a role, food insecurity (FI) is far more complex than just being hungry; it encompasses inconsistency with access, availability, and utilization of nutrient dense foods due to limited or lack of income and or other resources (USDA, 2018).

Inadequate food and nutrients cause deteriorating effects on both physical and mental health and are linked to higher incidences of depression, anxiety, obesity, diabetes (DM), hypertension (HTN), coronary heart disease (CHD), and stroke (Food Research and Action Center [FRAC], 2017; Silverman, Krieger, Keifer, Hebert, Robinson, & Nelson, 2017). FRAC (2017) reports a FI correlation with a higher healthcare cost due to emergency visits and hospitalization, having a cost differential of $1,863 of excess over the health costs in food secure group, further aggravating financial burdens with the greater expenses with DM ($4,413), HTN ($2,176), and heart disease ($5,144).

FI further impacts the management of these chronic diseases, as limited financial availability and access cause individuals to make compromises in the purchasing of medication and dietary regimens needed to manage their illness. These compromises result in "purchasing inexpensive, high-calorie, nutritionally poor foods instead of foods that are more healthful, such as vegetables, lean proteins, and whole grains" (Murthy, 2016, p. 655). Carlson and Keith-Jennings (2018) report food insecure individuals are four times more likely to neglect healthcare need when faced with other pressing needs by choosing food over medication, forgoing special

medical treatment and diets, taking less medication than prescribed, or not taking it at all due to cost. FI also has shown to further complicate the quality of life for these people, because in order to survive they are forced to make choices that can further worsen their health outcomes, with 65.9% experiencing forced choices between food and medical care (Weinfield et al., 2014).

The USDA classifies food security (FS) status using four status levels: high food security (HFS), marginal food security (MFS), low food security (LFS), and very low food security (VLFS) (USDA, 2018) (Appendix A). When discussing FI, the latter of four levels (LFS, VLFS) are used to describe the severity of FI. According to Healthy People 2020, it is reported that although food insecurity not necessarily causes hunger; still, hunger can be a possible outcome of FI. Additionally, food insecurity is not a measure in time as it may be long term or temporary and occurs at the individual level, as well as the household and community level. A myriad of factors exist around FI, some of which are inversely related, income, employment, race/ethnicity and disability (USDA, 2018).

Numerous efforts have been made to combat FI, including public sources and private sectors. Federally funded food assistance programs to help relieve the food burden include, the Supplementary Nutritional Assistance Program (SNAP) (previously known as food stamps), the National School Lunch Program, and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) (Kreider, Pepper, Gundersen, & Jolliffe, 2012; Kreider, Pepper, and Roy,2016). These federal sources have the major role to provide the majority of food assistance for FI population, yet private charities such as food banks, food pantries, and soup kitchens also have been valuable resources that supplement the shortfalls of federal assistance programs.

Individuals often rely on these private sectors to reduce household costs and meet nutritional needs in times of emergencies. According to Weinfield, et al. (2014), 63.2% of

households report using food banks or pantries on a regular basis, and these percentages increase in the elderly population to 75.7%. Additionally, soup kitchens serve as the primary food source for the majority of homeless people. Koh, Bharel and Henderson (2016) noted that "FI is six-fold greater in this population; these individuals suffer disproportionately from nutrition-related diseases such as DM, HTN, hypercholesterolemia; and they have a high burden of risk factors (e.g., alcoholism, drug use, mental illness and physical illness) which leads to unhealthy diets and poor nutrition" (p.1312). Weinfield et al. (2014) further expound that food assistance programs are more than just a safety net for this population: they are imperative in meeting and sustaining nutritional needs in these FI population.

While these entities serve as a buffer to FI, it has been concerned that food pantry rations are more likely to be high in fat, and low in fruits, vegetables, dairy, and micronutrients (Caspi, Davey, Friebur and Nannie, 2016). Long, Rowland, Steelman and McElfish (2017) share reports of food pantry users are in fair or poor health (47.4%), with 57.8% having HTN, and 32.2% having DM, and these percentages substantially increase with age. Considering that this population uses food pantries regularly, chances to take disease-specific dietary regimens can be compromised significantly, leading to uncontrolled disease and declining health status.

Need Assessment

The New River Valley (NRV) is located in southwestern Virginia and includes the counties of Floyd, Giles, Montgomery and Pulaski and the City of Radford. The overall population of this region is 182,993; of which, 18% live in poverty, which is higher than the State poverty rate (11.2%) (Robert Wood Johnson [RWJ], 2019). Poverty impacts the NRV area differently, ranging from 11.9% in Floyd County, 10.6% in Giles County, 14.8% in Pulaski County, 20.8% in Montgomery County, and 32.8% in Radford City (New River Community

Action, [NRCA], 2017). Similarly, NRV unemployment (from 3.8% to 5.6%) was also reported higher than the State's unemployment rate of 3.8%. The prevalence of FI rate in NRV areas ranged between 9 and 21%, lowest in Floyd County (9%), followed by Giles (10%), Pulaski (11%), and Montgomery County (14%); but highest in Radford City (21%) (Robert Wood Johnson Foundation, 2019).

The NRV prevalence of HTN (27%) and HC (18.6%) are relatively reportedly lower than the State incidence (30.9% HTN, 33% HC) (NRCA, 2017; United Health Foundation [UHF], 2020b, 2020c). However, the incidence of DM (19.3%) in the NRV is almost double the rate for the entire State of Virginia (10.9%) (NRCA, 2017; UHF, 2020a). Approximately, 14% of the population in the NRV Health District are reportedly uninsured, which is higher than the rate for the state of Virginia (8.8%) (NRCA, 2017). Considering the management of DM and HC is highly depending on the diet control and higher population in NRV is uninsured in this FI population, the poor health outcomes cannot be avoidable.

Approximately 6,374 individuals in 2,703 families were provided food assistance thru food pantries in the NRV in the year of 2015- 2016 (NRCA, 2017). According to *The New River Valley Community Health Needs Assessment 2018*, 29.4% of participants reported an inability to buy food in the past 12 months, and of those individuals, 11.2% reported reliance on food banks, soup kitchens and food pantries to help meet nutritional needs (Carilion Clinic, 2018). In addition to food pantries, six percent of individuals living below the poverty level are receiving SNAP. However, it is estimated that 15% of those who qualify are not receiving the benefits (NRCA, 2017). This data sheds light on the nature and seriousness of FI and the need for interventions to counteract the negative impact on health outcomes for this population.

Despite the seriousness of FI issues in the U.S., potential difficulties exist in reaching food-insecure populations for health promotion and illness prevention strategies because FI often accompanies limited access to healthcare and transportation. Long, et al. (2017) suggest food banks and food pantries provide a good entry point to access this population to offer new opportunities for implementing disease prevention or management strategies. Furthermore, Koh, et al. (2016) discuss soup kitchens as safety nets, with an untapped potential to impact the health and nutrition of vulnerable populations (p.1312). Long, et al. (2017) further postulate that educational strategies to improve health behavior and outcomes for this vulnerable group are auspicious.

Health promotion for the food insecure individual is complex and challenging and may not be effectively implemented using traditional healthcare measures. When faced with FI, individuals often engage in coping strategies by neglecting or delaying healthcare entry to offset other pressing needs. Thus, reaching this vulnerable population is challenging. Practitioners will need to move beyond the clinical setting to implement health promotion measures in different settings in which this population frequents. Private charitable food programs appear to offer a prime environment to provide health promotion and disease management strategies, as these entities serve as a buffer to FI for this vulnerable population. However, despite the promising opportunities in which the private sector may offer, studies utilizing food bank and food pantry interventions to improve health and nutrition outcomes are limited, signifying a gap in the literature.

Overall Purpose

This study aims to shed some light on the effectiveness and feasibility of using a food bank/food pantry approach to access and improve health outcomes for food-insecure populations. Specifically, this community project had three objectives (a) to determine the level of FI in individuals using food pantries in the NRV region, (b) to investigate the correlation between FI severity and the demographic, comorbidity and health behavior data, and (c) to evaluate the feasibility and the effectiveness of a dietary and community resource awareness session among individuals who used food pantries located in the NRV region in southwestern Virginia.

Research Questions and Hypothesis Statements

The following research questions were addressed in this study:

1. Is there a correlation between FI and severity and the demographic, comorbidity, and health behavior data of individuals who visit food pantries within the NRV during the study period (May 1-July 15th, 2020)?

- (H_0) no significant correlations of FI status or severity with the demographic, comorbidity, and health behavior data are observed
- (H_1) significant correlations of FI severity with the demographic, comorbidity, and health behavior data are observed

2. Will providing one healthy nutrition education session affect the knowledge, confidence, and attitude of food insecure individuals who visit the food pantries within the NRV during the study period (May 1-July 15th, 2020)?

- (H_0) providing education on healthy nutrition did not affect food pantry user knowledge, attitude, or confidence.

- (H_1) providing education on healthy nutrition did affect food pantry user knowledge, attitude, and confidence.

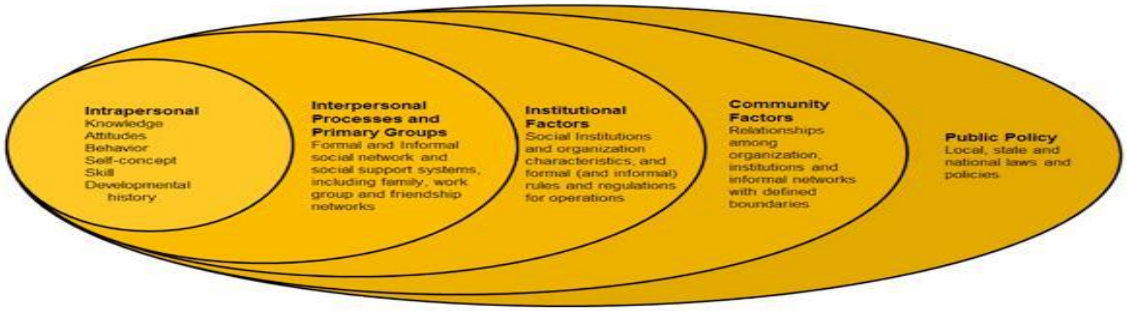
3. Will providing one community resource educational session affect resource awareness and usage intentions among food insecure individuals who visit the food pantries within the NRV during the study period (May1st -July 15th, 2020)?

- (H_0) providing education on community resources did not affect food pantry user awareness or usage intentions.
- (H_1) providing education on community resources did affect food pantry user awareness and usage intention.

Conceptual Framework

The Ecological model served as the conceptual framework for this project. When considering a health promotion intervention for individuals, it is essential to recognize the multifaceted milieu in which an individual exists and interacts and how the diverse systems affect individual behavior (Glanz, Rimer, Viswanth, 2015). The complex interplay between the individual, their family community, societal factors, including public policy, recognized in the Ecological model provides the foundation of the understanding of contributing factors involved in the health behaviors of food insecure populations (Glanz, Rimer, and Viswanth, 2015). Newes-Adeyi, Helitzer, Caulfield, Bronner (2000) report that the model consists of five levels of influence: individual, interpersonal, organizational, community, and policy. The interconnecting circles of the Ecological model (Figure 1) demonstrates elements at one level can also influence elements at another level simultaneously.

Figure 1 Ecological Model



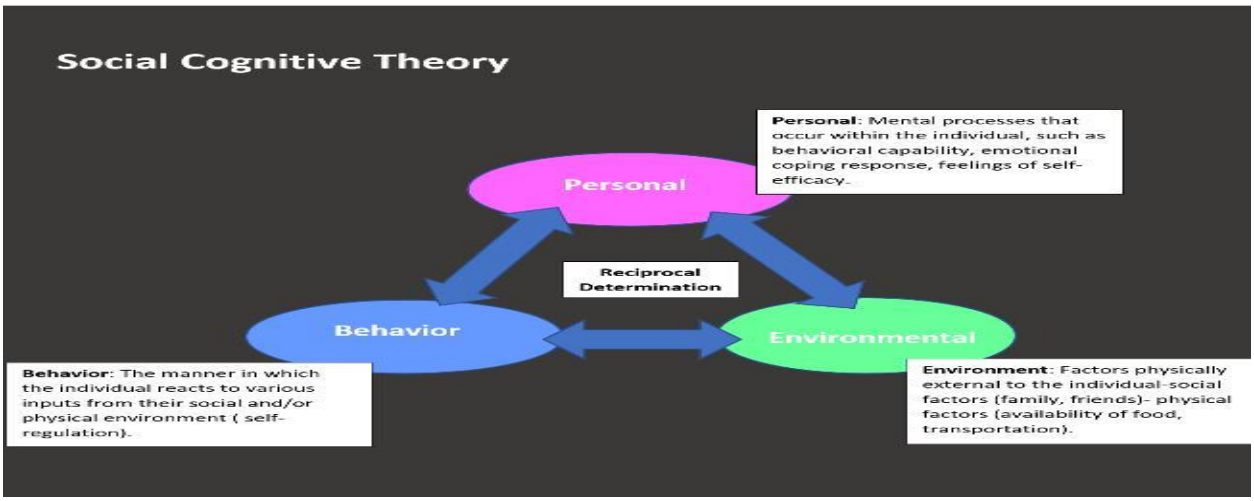
Note. Ecological Model Diagram. Adapted from Glanz, K., Rimer, B. K., & Viswanath, K. (2015). Health behavior: Theory, research, and practice. San Francisco, CA: Jossey-Bass.

Effectively promoting healthy nutrition and health behaviors among food insecure populations, requires not only an understanding of the multi-faceted levels of influence but also an understanding of how these determinants influence behavior, leading to both positive and negative changes in practice at the personal and population level.

The Social Cognitive Theory (SCT) (Figure 2) has also been widely used in the literature to predict health behaviors and elicit behavioral change (Doerksen, & McAuley, 2014, p.1) Providing food insecure individuals with education alone, to change food pantry user behavior would not have been as effective if the environmental conduciveness for healthy behaviors failed to be addressed (Glanz, Rimer and Viswanth, 2015). To combat the environmental barriers, SCT guided the necessity of community resource session to improve health outcomes in this specific food insecure population (Glanz, Rimer and Viswanth, 2015). In this study, community resource education session will be introduced to improve the awareness for alternative community support measures for foods, clothing, housing, and free clinic to offset some of the obstacles and burdens these population may encounter daily in modifying their health behaviors. The SCT further guided the provision of the study incentive (Glanz, Rimer and Viswanth, 2015). In this project, the provision of the cookbook with recipes for preparing healthier meals under four dollars,

nutritional tips for eating healthier on a budget, reading food labels and measures to extend food budgets, providing lists of local community resources for foods, clothing, diapers, housing, and free healthcare clinic, and providing hand-made masks during COVID-19 pandemic will be provided, which serve as an incentive measure for healthy behavior reinforcement and helps to maintain goal-directed behaviors over time.

Figure 2 Social Cognitive Theory



Note. Social Cognitive Theory. Adapted from Glanz, K., Rimer, B. K., & Viswanath, K. (2015). Health behavior: Theory, research, and practice. San Francisco, CA: Jossey-Bass.

Summary

Food insecurity is a known health inequality that continues to plague millions of Americans. Despite numerous attempts using government and charitable programs, the health disparities for food insecure populations continue to result in increased health care costs and declining health status. Social determinants are known for their negative impact on health outcomes, with FI being one of the most significant contributors to worsening disease status, as many of these chronic diseases rely on diet specific foods. As the problem of FI in America persists, the need for health promotion and prevention strategies is paramount to the health outcomes for food-insecure populations. Previous research has suggested that nutrition education interventions have the potential means for improving food-related knowledge and behavior

among low-income communities. However, this vulnerable population is often unreachable in the clinic setting, as competing needs usually take precedence, signifying the importance of moving beyond the traditional clinical setting to explore alternative settings for reaching vulnerable and marginalized populations with health prevention and promotion interventions. The following chapter discusses the literature review related to interventions used to improve health outcomes for food-insecure people.

Chapter 2: Literature Review

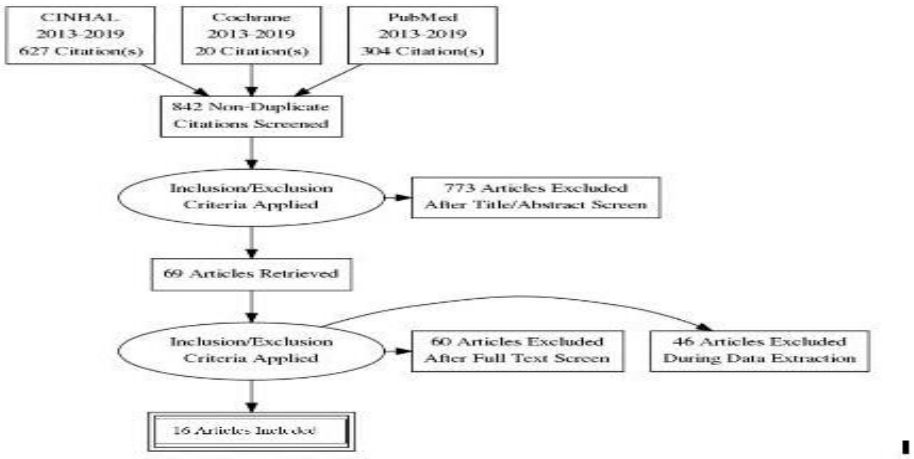
Search Strategies and Outcomes

Literature was gathered from the years 2013-2019 using the following databases: Cumulative Index of Nursing and Allied Health Literature (CINAHL), the Cochrane Database of Systematic Reviews, and PubMed. Keywords for the search strategy included the following: food insecurity, food security, homeless, food bank, food pantry, soup kitchen, intervention, education, correlation, health, chronic diseases, diabetes, heart disease, hypertension, and high cholesterol. The resulting literature abstracts and full text found using all the keywords were screened for inclusion and exclusion. Inclusion criteria were (a) FI and nutrition (b) FI and chronic disease (DM, HTN, HC) (c) FI and coping strategies (e) FI interventions in food bank/food pantry/soup kitchen settings (f) educational/nutritional/health interventions to improve FI (g) published in English from 2014 to 2019. Exclusion of literature for this study were those not published in English, those published before 2014, those implemented in healthcare settings, and those having pediatric participants.

The literature search produced 951 articles and or studies using the keywords FI, food insecurity, food security, homeless, food bank, food pantry, soup kitchen correlation, health, chronic disease. Further refinement in the search used keywords, abstracts, subject headings, and or titles, which included FI, interventions, health, diabetes, hypertension, heart disease, nutrition, which resulted in the exclusion of 178 articles and studies. The application of the following keyword phrases: FI interventions, health, food, nutrition, and educational interventions; to the subject headings, titles, and abstracts, excluding 110 articles and studies. The remaining 69 literary works reviewed further for alignment with the inclusion criteria and duplicated and

uncorrelated articles and studies were excluded following the first literature search. The detailed search process and outcomes were addressed in the PRISMA chart in Figure 3.

Figure 3. Search Strategy



Sixteen articles were identified based on relevance to the topic of interest and included for the final analysis. The articles were reviewed based on the methodological quality of design, validity, and applicability. The level of evidence of the 16 studies consists of seven systematic reviews(SR), three randomized control trials (RCT), three quasi-experimental nonrandomized control trials (NRCT), and three cohort case studies (CC), as seen in Figure 4 below.

Figure 4. Levels of Evidence

I Systematic Review	II Randomized Controlled Trial	III Quasi Experimental Non-Random Controlled Trial	IV Cohort Case Study	V Systematic Meta-Synthesis Qualitative Studies	VI Single Qualitative Descriptive	VII Expert Opinion
Berkowitz, 2013	Grilo, 2015	Caspi, 2016	Dave, 2017			
Bomberg, 2019	Heerman, 2016	Knight, 2016	Driver, 2016			
Ippolito, 2017	Silverman, 2015	Seligman, 2015	Schroeder, 2019			
Seligman, 2018						
Shin, 2015						
Simmet, 2017						
Venci, 2018						

Among 16 studies of FI populations, nine studies were conducted with diabetes population and three other studies included communities having chronic diseases such as HTN, HC, depression, and functional limitations. Seven studies implemented interventions using a food bank, food pantry, food shelve, or soup kitchen approach. Interventions included health screenings, nutrition education, disease-specific education, nutrition, and education need assessment, diet-specific food provision, and hands-on cooking skills. Appendix B summarizes the 16 studies and Appendix C summarizes the interventions used to improve FI health outcomes.

Prevalence of FI Population in the U.S.

According to the USDA report (2018), one out of eight Americans (12.5%, 40 million out of 329 million) are food insecure and suffering from illnesses because they do not have sufficient food. The results are similar with ones from the 2011 National Health Interview Survey (NHIS), where a household survey were conducted by the Centers for Disease Control and Prevention's National Center for Health Statistics among a sample of 30,010 households, representative of the noninstitutionalized U.S. population (Venci & Lee, 2018, p.183). In the NHIS study, the percentage of FI was 13.2% (Venci & Lee, 2018).

The prevalence of FI also seems to be higher among populations having chronic diseases, ranging from 12.2% to 17%. In the secondary analysis study among the diabetic adult sample (n=2,557) analyzed from the National Health and Nutrition Examination Survey (NHANES) data, Berkowitz, et al. (2013) found FI among diabetic patients were 12.2%, similar to that of the U.S. population. Knight, et al. (2015) also performed a large-scale cross-sectional analysis of the 2011 NHIS, finding 9.4% of the overall sample (n=3,240) had DM and 17% of these diabetics conveyed FI.

Risk Factors Associated with FI. Several studies showed FI is more likely observed in smokers, females, racial or ethnic minorities, individuals with low socioeconomic levels and individuals having higher BMIs (Knight, et al., 2016; Schroeder, et al., 2018; Shin et al., 2015; Venci & Lee, 2018). A cross-sectional analysis of a nationally representative sample conducted by Knight, et al. (2016), reported that FI was commonly found in females, Blacks (28.7%) and Hispanics (26.5%). FI was also observed higher among those having lower education and lower incomes and also among the unemployed and uninsured (Shin, et al., 2015; Venci & Lee, 2018). Especially, being disabled, unmarried and or having three or more children was also found prevalent among the categories of LFS and VLFS. Also, in return, Berkowitz, et al. (2013) reported that FI was a factor which negatively impacted the ability to purchase health insurance.

Numerous studies found the incidence of FI to be higher in younger adult populations than in the elderly populations (Heerman, et al., 2015; Knight, et al., 2016; Venci & Lee, 2018). Approximately 30.8% of young adults (18-44 years) were found food insecure in the cross-sectional population study by Knight et al. (2016). Heerman et al. (2015) observed that FI participants had a lower median age (51 vs. 55 years) and lower incomes than FS participants (Heerman, et al., 2015). Similar finding was observed in Venci and Lee's (2018) study, where they categorized food security status into four levels: high food security (HFS), Marginal food security (MFS), low food security (LFS), and very low food security (VLFS) using the 10-item USDA Adult Food Security Survey Module. In their study, the LFS and VLFS categories made up 13.2% of the sample population and the prevalence of LFS and VLFS was highest among younger adults (18-24 years), females and non-Hispanic Blacks (Venci & Lee, 2018).

Correlation between FI and Chronic Disease

The current literature suggests an inextricable link between FI, chronic disease, with sharply increasing disease presence and worsening disease outcomes as the level of FI gest severe. Four studies ranging from 2013 to 2018 found significant findings correlating FI to chronic disease, inadequate disease management, and increased use of emergency services and hospitalizations (Berkowitz et al., 2013; Schroeder, 2018, Venci & Lee, 2018).

Venci and Lee's (2018) population-based study found a robust connection between severe FI and increased disease prevalence with DM (83.9%, vs. 66.7 %, $p<0.05$), HTN (75.5% vs. 56.4%, $p<0.05$), and heart disease (84.8% vs 73.4%$p<0.05$) when compared to FS cohorts, respectively. Using indicators of poor glycemic control (A1C >9%), poor cholesterol (LDL >100), and poor BP control (>140/90), Berkowitz, et al. (2013), investigated the relationship between FI and the spectrum of cardiovascular control using pooled data obtained from their NHANES analysis,, finding over 12% of the adults with DM (n=371) were food insecure and 16% (n = 414) had poor A1c control. When comparing food insecure adults with those being food secure, FI correlated with significantly higher proportions of poor glycemic control (27.0% vs. 13.3%, $p=0.001$) and poor LDL control (68.8% vs. 49.8%, $p = 0.002$). However, the study findings did not correlate FI with poorly controlled BP (31.8% FI vs. 32.9% FS, $p = 0.75$). These findings suggest that FI is likely to directly impact diet-sensitive chronic disease management such as DM and hyperlipidemia with poor glycemic and LDL cholesterol control; however, FI does not directly affect BP which requires long-time atherosclerosis process (Berkowitz, et al., 2013).

Several studies found significant correlations between FI and chronic diseases and poor control of chronic disease (Berkowitz, et al., 2013; Silverman et al., 2015; Venci & Lee, 2018). Venci & Lee (2018) examined the correlation of FI with functional limitation and chronic

disease, finding a higher prevalence among adults having LFS and VLFS when compared to food-secure (FS) adults. When compared to FS adults, the adjusted odds ratios (OR) were significantly higher in food insecure adults (both LFS and VLFS), respectively, for functional limitation (OR= 1.87 vs. 2.20), inflammatory diseases or joint/muscular pain (OR =1.42 vs. 1.74), DM (OR= 1.26 vs 1.23), HTN (OR= 1.18 vs. 1.42), and coronary heart disease (OR= 1.16 vs. 1.75) (Venci & Lee, 2018).

Silverman, et al. (2015) analyzed baseline data from the *Peer Support for Achieving Independence in Diabetes* study (n=287) and evaluated relationships between glycemic control and depression, DM distress, and low medication adherence using linear regression. DM distress refers to an individual's stress association with disease management and glycemic control. Significantly higher mean A1c levels were observed in individuals with depression (β=0.51; p=0.02) and DM distress (β=0.64; p=0.003), even after adjusting for sex, age, race/ethnicity, language, education, marital status, BMI, and insulin use (Silverman, et al., 2015). Differently, no significant association between low medication adherence (β=0.38; p=0.08) and glycemic control was seen. The study revealed that FI participants were more likely to be depressed (*40.7 % vs.15.4 %, p<0.001*), report DM distress (*55.2 % vs. 33.8 %, p<0.001*) and have a low medication adherence *(52.9 % vs. 37.2 %, p=0.02* (Silverman, et al., 2015).

Using a 365- day prior enrollment period requirement, Schroeder, et al. (2018) analyzed data from the Medicare Total Health Assessment (MTHA) sample of diabetic adults 65 years and older (n=10,052) and found 8.1% were food insecure. The study found food insecure individuals were more likely to be taking insulin (25% vs. 19.4%) and had a higher A1c at baseline (12% vs. 6.3%), with almost double the prevalence of having an A1c $\geq$ 9%, when compared to FS counterparts. Even with one-year follow-up study, higher A1cs were seen in the

food insecure groups (7.5% vs. 7.2%, $p \leq 0.001$) and higher incidences of ER visits (23.9% vs. 18.2%, $p<0.001$) and hospitalizations for disease exacerbations (16% vs. 11.9%, $p=0.005$) were observed in the food insecure group when compared to those being FS.

Furthermore, Shin, et al. (2015) evaluated the gender differences in the association between FI and dyslipidemia in a representative sample of Wisconsin adults (*SHOW)*. The analysis of *SHOW* data rendered a study sample of 1,663 non-institutionalized/non-active duty adult residents, ages 21–74 years, having a recent history of FI and dyslipidemia diagnosis. Multivariate adjustments depicted a recent history of FI was significantly associated with a higher prevalence of obesity (51.9%, $p=0.003$) and a higher likelihood of low HDL-C (67.4%, $p=0.001$) among women. However, no significant association was found between FI and obesity and low HDL-C in men. Also, no significant association was found between FI and the elevated total cholesterol level in both women and men. The reasons of gender outcome differences cannot be definitively be discerned but they are consistent among previous study findings of FI and obesity among women. Shin, et al. (2015) discusses plausibility in the dietary decision making by women experiencing FI being different than choices men make in the same situation. Other researchers hypothesize that these gender differences may be due to food insecure women preferentially giving available nutritious food to their children and choosing to consume unhealthy foods themselves (Shin, et al., 2015, p.7).

Non-healthy Lifestyles among Food Insecure Populations

Food insecure households have been shown to engage in non-healthy lifestyle measures which could negatively impact their health outcomes (Bomberg, et al., 2019). FI populations are often faced with having to make trade-offs and or choices between paying for food, utilities, or transportation versus medication/medical care. This results in coping strategies of buying the

cheapest versus more-healthier food, skipping meals, scrimping, and or foregoing medication altogether just to make ends meet (Berkowitz, et al., 2013; Bomberg, et al., 2019; Heerman, et al., 2016; Ippolito, et al., 2016; Knight, et.al, 2016; Schroeder, et al., 2018; Seligman, et al., 2015; Seligman, et al., 2018).

Bomberg, et al. (2019) analyzed data from the *Hunger in America 2014 survey (n=49,751)* to understand food preferences and coping strategies among diabetic (34.2%) and nondiabetic (63.8%) households who used food pantries for nutrition assistance. Of the sample, nearly all pantry users (95.7%) engaged in at least one of the above coping strategies in the 12-months prior, with the most common approach being "consuming the cheapest food knowing it was not the healthiest," which was reported by 80% of pantry users (Bomberg et al., 2019, p.11). Sixty-seven percent said making a "choice between paying for food" and medical care, utilities (71.9%), housing (58.7%), and transportation (69.9%). Overall, the mean coping strategies used among diabetic pantry users were higher than other pantry users (6.8 vs. 6.4, $p<0.001$). After adjusting for household size, annual household income, and health insurance status, food insecure households with DM had higher odds of buying food in dented or damaged packages (56.6% vs. 51.8%, $p < 0.01$), consuming food after its expiration date (60.8% vs. 55.3%, $p < 0.01$), and watering down food or drinks to make them last longer (42.4% vs 39.7%, $p < 0.01$) compared to households without DM (Bomberg, et al., 2019, p. 11). After household level covariate adjustments, spending trade-offs in diabetic households compared to those of non-diabetic households were increased in choosing between paying for food and paying for medical care (74.6% vs. 64.1%, $p < 0.01$), utilities (74.4% vs. 64.15, $p < 0.01$), and transportation (71.1% vs. 67.7%, $p < 0.01$ (Bomberg, et al., 2019).

Similarly, Knight, et al. (2015) also conducted a study to evaluate the correlation between FI and medication scrimping. Types of medication scrimping behaviors include any of the followings: “couldn't afford prescription medicine,” “skipped medication doses to save money,” “took less medicine to save money” or “delayed filling a prescription to save money.” (Knight, et al., 2015). These behaviors can result in increased risk of adverse clinical outcomes and poor metabolic control among food insecure people with DM. Knight, et.al (2016) found 45.6% of FI diabetic respondents reported medication scrimping ($p<0.001$). Approximately one in five diabetics reported some form of medication scrimping with the most common form being delaying prescription refills to save money (16.4%), followed by inability to afford medications (15.0%), taking less medication (13.8%) and skipping doses (13.1%) (Knight, et al., 2015). Scrimping behaviors were highest among the MFS and FI groups. Of the FI group 35.2% reported skipping doses, 36.5% took less medication and 43.7% delayed filling medications to save money ($p<0.0001$). In contrast, the prevalence of these behaviors were significantly low, ranging from 7.6% to 11.7% among FS diabetics (Knight, et al., 2015). Strong positive correlations were observed between FI and medication scrimping even after adjusting for other financial constraints, such as income level and insurance status ($p<0.001$). The study findings are consistent with other research findings on DM and FI.

In another study with diabetic patients, Heerman, et al. (2015) assessed medication compliance among DM patients using The *Adherence to Refills and Medication Scale (ARMS).* In their study, they found a strong association with FI and non-adherence to refills and medications (0=0.002). Similarly, Ippolito, et al. (2016), evaluated the association of FI and DM self-management among food pantry clients (n=237). DM self-management was based on eight indicators: HgbA1c, DM self-efficacy, DM distress, medication non-adherence, severe

hypoglycemia, depressive symptoms, medication affordability, and food–medicine purchasing trade-offs) (Ippolito, et al., 2016, p. 184). Significant correlations were found between VLFS, LFS and poor DM self-management. VLFS groups had higher BMI (*35.0 vs 32.7kg/m2, p=0·009*); higher incidence of tobacco use (*31% vs.12%, p<0·001*); , lower DM self-efficacy scores *(7.3% v.6.55, p<0.001);* higher DM distress; higher non-adherence scores (*0.9 vs. 1.3, p<0.001*); increased incidence of severe hypoglycemia episodes (*7 vs.18, p<0.001*) when compared with FS groups (Ippolito, et al., 2016). Additionally, both the LFS and VLFS groups had higher odds of depressive symptoms (49 vs. 82, p<.001); experienced more challenges around affordability of medications/diabetic supplies (11 vs 45, p<0.001); and had more occurrences of trade-offs between food and medications/medical supplies(16 vs. 41, p<0.001), in comparison to the FS cohort.

Roles and Challenges of Food Banks/ Pantries in Health Outcomes in FI Patients

A common approach among FI populations to increase food access is to use food banks and pantries (Bomberg, et.al, 2019). According to the USDA, FI population increased from 10.5% in 2000 to nearly 12% in 2004, peaking at 14.9% in 2011 (2019). This has led to an increased reliance on the food bank system, with two-thirds of users depending on regular access to help with their monthly food budgets (Seligman, et al. (2015). Feeding America, a leading domestic hunger relief organization, cited by Knoblock, et al. (2017), supports a network of over 200 food banks serving an estimated 46 million food insecure individuals in America every year. Dave et al.'s study (2017) support these findings with an observed increase in food pantry usage, finding 60% of participants accessed the food pantry every month, and 40% visited the pantry twice a month. Furthermore, the prolonged use of food pantries is habitual despite enrollment in federal assistance programs (SNAP, WIC) (Dave et al., 2017).

FI is linked to the poor outcomes of many diet-sensitive diseases, which presents a challenge in disease management for food pantry users, as often the dietary provisions by food pantries are high in fat, salt, and sugar and low in nutrient quality (Berkowitz et al., 2013; Caspi, Davey, Friebur, & Nannie, 2016; Knight et al., 2016; Seligman et al., 2018; Simmet et al., 2017). Individuals seeking assistance at food pantries report inability to obtain healthy food options such as fruits, vegetables, dairy, and protein. Bomberg, et al. (2017) found more than 56% of households wanted, but could not obtain, fruits and vegetables; 48% could not obtain proteins and 42% could not get dairy products. Higher percentages of food insecure households with DM experienced the difficulty to access the healthy foods: wanted, but were unable to obtain fruits and vegetables (*59.1% vs. 55.0%; p<0.01*), proteins (*50.0% vs. 47.4%; p=0.03*), and dairy (*43.8% vs. 41.1%; p = 0.01*) in comparison to households without DM (Bomberg, et.al, 2017). These findings may be reflective of the limited variety of food pantry provisions.

Simmet, et al. (2017) investigated the quality of food pantry diets using a systematic review of cross-sectional cohort and intervention studies compiled from 1980 and 2015. Healthy eating index scores (HEI) were used to assess the overall dietary quality with scores less than 50 indicating an inadequate diet. HEI scores were less than 50, in all samples with the exception of one small US. study sample (Simmet, et.al, 2017). The review revealed dietary intake of food pantry users did not meet recommendations and their dietary quality was poor, as reflected by inadequate intake of calories, fruits/vegetables, dairy products and calcium. Additionally, large percentages of the study populations did not meet recommendations for vitamins A, C, D, B, iron, magnesium, and zinc.

FI has become a chronic issue in the U.S. and has placed food pantries in a prime position for health promotion opportunities for FI populations. Health promotion measures can be

strategically placed at food pantries in underserved communities, making it possible to reach out to some of the most vulnerable and marginalized population groups with chronic disease (Seligman, et.al, 2015).

Interventions to Improve Health Outcomes for Food Insecure Populations

Several efforts have been existed to improve health outcomes more than providing foods through food pantry approaches. Interventions implemented to improve health outcomes for food insecure populations include (a) FI and health screenings, (b) nutritional and educational needs assessment, (c) cooking and nutrition education, cooking demonstrations, (d) disease-specific nutritious food provisions, (e) chronic disease self-management support, and (f) behavioral interventions/educations for healthy lifestyle (Berkowitz, et al., 2013; Bomberg, et al., 2019; Caspi, et al., 2016; Driver & Frieson, 2016; Grilo, et al., 2015; Heerman, et al., 2015; Knight, et al., 2015; Seligman, et al., 2015; Seligman, et al., 2018; Shin, et al., 2015; Silverman, et al., 2015; Venci & Lee, 2018). The outcomes of these interventions will be discussed in the following paragraphs.

Food Security and Health Screening Interventions. Many of the studies reviewed performed client screenings as part of their intervention, which included measurement of FI, health behavior and outcomes (Berkowitz, et al., 2013; Bomberg, et al., 2019; Dave, et al., 2017; Grilo, et al., 2015; Heerman, et al., 2015; Ippolito, et al., 2016; Knight, et al., 2015; Schroeder, et al., 2018; Seligman, et al., 2015; Seligman, et al., 2018; Shin, et al., 2015; Venci & Lee, 2018). The USDA Household Food Security Survey Module has been the major tool used to assess FI. This screening tool has been validated and deemed reliable through several studies (USDA, 2018). Various versions including a 3-, 6-, 10-, or 18 item survey and individual versus household versions have been provided to measure the FS status and or level of FS and those

versions have been validated through twenty years of research, effective to differentiate FS, MFS, LFS and VLFS groups and to show the correlation between the severity FI and poor health outcomes (USDA, 2019). For example, Venci and Lee (2018) measured FS status using the 10-item version of the USDA Household Food Security Survey and reported LFS and VLFS adults have increased odds of coronary heart disease (16% and 75%, respectively) when compared to FS adults (aOR =1.75); higher prevalence of HTN (18% and 42%, respectively when compared with FS counterparts (aOR =1.42) ; and higher odds of having arthritis (42%, and 74% greater, respectively) when compared with FS adults (aOR= 1.74) (Venci & Lee, 2018).

In several studies, health screening interventions accompanied outcome measurement and screening/monitoring for the presence of disease, primary care utilization, medication use, ER visits, and hospitalizations in addition to biometric and lab parameter screenings (BP, BMI, FBS, A1c, LDL and HDL) (Berkowitz et al., 2013; Bomberg et al., 2019; Dave et al., 2017; Grilo et al., 2015; Heerman et al., 2015; Ippolito et al., 2016; Knight et al., 2015; Schroeder et al., 2018; Seligman et al., 2015; Seligman et al., 2018; Shin et al., 2015; Silverman, et al. 2015; Venci & Lee, 2018).

In the study of Bomberg, et al. (2019), they further investigate the 34.2% of their sample (49,751) who have DM. and food insecure diabetics had higher A1c's when compared to their food secure counterparts (7.5% vs. 7.2%, $p<0.001$). Schroeder, et al.'s (2019) diabetic health screening found HTN was also present (90.3%), along with A1cs greater than 9% (12%) among food insecure individuals. Food insecure individuals were also more likely to have ER visits (23.9% vs. 18.2%, $p< 0.001$) and hospitalizations (16 vs. 11.9, $p=0.005$) when compared to those having FS. Increased BMI (>30) and insulin use (68.4%) was observed among food insecure groups in the health screenings obtained by Silverman, et al. (2015). Correspondingly, Ippolito,

et al. (2016) found BMI >30 was greatest among the VLFS group and differed significantly from that of the food-secure group (35·0 v. 32·7 kg/m2, P=0·009). Additionally, adults with FI comprised a significantly higher proportion of those with poor glycemic (27.0 vs. 13.3%, p= 0.001) and LDL control (68.8 vs. 49.8%, P = 0.002) in the study by Berkowitz, et al. (2013).

Nutrition and Education Needs Assessment. Nutritional and educational needs were assessed in several studies from food pantry personnel and food pantry clients, (a) either using individual and focus group interviews prior to implementing the study interventions or (b) tracking down the dietary intake and quality using 24-hour recalls.

Focus group and individual sessions were often used as the methods to interview both the pantry personnel and pantry users to obtain information on existing pantry education and services, along with input on potential strategies to address obesity and the nutritional and educational needs of food pantry users (Dave et al., 2017). Data gathered included (a) current pantry services and foods received from the pantry, (b) consumption patterns of those foods, (c) ongoing nutrition education; (d) desired foods and services, (e) perceived client needs on nutrition education program (topics of interests), and (f) preference for pantry delivery mode (Dave et al., 2017). In addition, Dave et al. (2017), in their study, used a problem-posing method where clients perform critical reflection on the session topics, to develop the nutrition education program for obesity prevention in FI population (Dave, et al., 2017). Data was obtained using qualitative methods, consisting of open-ended script questioning sessions (45-60 min), which were audiotaped, observed by a moderator, and followed up with debriefing.

The recommendations from the pantry personnel included conducting nutrition education classes on site with nutrition topics such as food groups, portion sizes, recipes, eating on a budget, cooking skills, food labels and disease specific food choices (Dave, et al., 2017).

However, most pantry staff reported they did not want to be directly involved in attrition of the education program, reporting it would increase their burden of work. The interview sessions with the food pantry users found individuals wanted to learn how to eat on a budget, afford food after paying all their bills, and nutrition and exercise education to prevent chronic diseases. The food pantry users reported a preference for group face-to-face educational classes as a method of delivering class.

Differently, Caspi, et al. (2018) assessed dietary need and quality/nutrition by tracking down the participants' dietary intake and quality using 24-hour recall individual interview reporting all foods and beverages consumed from midnight to midnight the previous day. Based on dietary recall data, a Healthy Eating Index (HEI) 2010 was used to sum up nutritional components based on the index range of 0–100 (Caspi, et al., 2018). The HEI index was created by USDA to measure the degree to which a participant' diet conveys to federal dietary guidelines. A higher HEI score indicates a more balanced and healthful diet. Of the 63 participants enrolled in the study, Caspi, et al., (2018) measured the HEI score at pre-intervention (T1), and post-intervention (T2) and follow up assessments after 30 days (T3) after providing data education session and cooking session. The baseline dietary quality was low, having an average HEI score of 50.9 with less than 40% for whole fruits, greens and beans, whole grains, seafood and plant protein, and fatty acids, signifying dietary inadequacy (Caspi, et al., 2018).

Dietary Education Interventions-Content Development. Dave, et al. (2013) took food pantry client input into consideration when developing their nutrition educational intervention including preferred food provision, consumption patterns, foods desired, and preferred method of delivery. The six nutritional educational sessions were delivered over a six-month period using face-to-face education sessions by the pantry staff with supplementary handouts. Topics of

discussion incorporated physical activity options for home, healthy recipes using pantry foods, food budgeting, and food preparation (Dave, et.al, 2013). Dave et al. (2013) developed a health program using the food pantry needs assessment findings, which provided information about preferred food provision, consumption patterns, desired foods, preferred delivery method. Food pantry personnel implemented six (30-40 min) nutrition education sessions over six months, via face-to-face education sessions with supplementary handouts. Topics of discussion incorporated healthy recipes using pantry foods, food budgeting, food preparation in addition to education for increasing physical activity (Dave et al., 2013).The varying levels of nutritional knowledge seen correspond with other research on low-income populations (Dave et al., 2013). Notable findings from this study are (a) the food pantry provided a unique opportunity to reach a vulnerable population, (b) food pantry personnel and pantry user input on solutions for changing and improving health behavior associated with FI were used to develop a more promising health program for improving the success; (c) despite having limited resources, food-insecure families have a desire to eat healthy foods.

Dietary Education Interventions -Session Design. Different strategies using dietary education have been implemented and utilized in food pantry settings aimed to improve and sustain healthier nutritional lifestyles. Driver and Frieson (2015) provided a one-hour nutritional education session to low-income individuals in a soup kitchen (n=16) and a Head Start (n=9) community setting. Education focused on the five food groups, daily servings, and critical consumer messages from the USDA *MyPlate* recommendations. *MyPlate* training included components of a healthy diet and how to build a healthy meal using low-cost ingredients. Also, food safety topics, such as kitchen hygiene and safe food storage, were discussed (Driver & Frieson, 2017). Pre-and-post-assessments measured changes in nutritional knowledge finding

significant improvement in nutrition knowledge ($t=2.82$, $p=0.001$) and a considerable increase in food safety knowledge ($t=6.05$, $p<0.0001$).

Differently, Caspi et al. (2017) provided education sessions over six weeks using the Cooking Matters® course curriculum designed for low-income families. Nutrition education consisted of 30–40-minute sessions that addressed a range of nutrition-related themes (e.g., reading food labels, understanding different kinds of fats). At the end of each class, participants received key ingredients to take home to try the featured recipes. Outcome measurement of participant pre-intervention (T1), post-intervention (T2), and one month follow up (T3) were evaluated using the HEI. While mean HEI scores were not significant at (T3) follow-up, significance was seen in HEI scores, which increased from (T1) to (T2) respectively (50.9, 58.5, $p=0.01$) (Caspi et al., 2017).

Lastly, in the study of Seligman, et al. (2015), they implemented dietary and nutrition education with the form of pamphlets, and recipe cards placed in the participant's food boxes without the face-to-face educational session. Even providing supporting educational materials, these methods were shown to be effective to increase fruit and vegetable intake in 60% of participants. Furthermore, an increase in fruit and vegetable intake was also reported in children ages 0-children ages 0–5 (51%) and in children ages 6-18 (54%) after educational interventions

Hands-On Cooking Session Interventions in FI Population. In addition to providing nutritional education, Caspi, et al. (2017) simultaneously included demonstrations and hands-on cooking sessions to investigate cooking self-efficacy, new foods self-efficacy, meal preparation, and meal planning skills among food pantry users. Evaluation of pre-intervention (T1), post-intervention (T2), and 30-day follow-up (T3) data were collected to assess the effectiveness and the feasibility of the intervention (Caspi et al., 2017). Approximately 71% (n=45) of participants

completed both T1 and T2 measures, and 80% of those participating at T2 also completed T3 (n = 36). Significant findings were observed in mean cooking skill score increases from T1 to T2 (33.1, 35.9, respectively, p = 0.002). Additionally, there was a sustained mean increase of 2.97 points in cooking skills scores from T1 to T3 (p = 0.003).

A cooking demonstration was also included in the study conducted by Driver and Frieson (2016) with the aim of improving healthy meal preparation with limited resources and budget. Participants took part in a one time, one-hour presentation comprised of a cooking demonstration and taste testing. Pre-and-post-assessments included five questions addressing participant cooking confidence rated on a Likert scale continuum from 0 (cannot do at all) to 10 (extremely certain can do) and the sum of the five constructs of cooking confidence were used to create a total cooking confidence score. Driver and Frieson (2016) noted that participants reported relatively high levels of confidence toward meal preparation both prior to and following the intervention. No significant improvements were observed in the individual constructs nor in overall cooking confidence (p=0.25), indicating that a onetime cooking session is not sufficient to improve the cooking confidence. In contrast, participation in the one-hour nutrition education intervention was shown to effective to lead to a significant improvement in nutrition knowledge related to the USDA's MyPlate food guide (t=2.82, p=0.010) and significant improvement in food safety knowledge (p<0.0001) (Driver & Frieson, 2016, p. 91-92).

Chronic Disease Self-Management Education and Support. A six-month pilot study was implemented by Seligman, et al. (2015) to determine the feasibility of using a food bank/pantry setting to provide DM support. Three food banks were used as sites of implementation and included a sample size of 768 subjects. The intervention consisted of four major components: (a) screening for DM and monitoring of glycemic control and severe

hypoglycemia, (b) provision of DB-appropriate food, (c) health care referrals for those lacking primary care providers, and (d) DM self-management support and education. Eligibility criteria included A1c≥ 6.5% or a self-reported diagnosis of DM plus presentation of one or more DM medication bottles. Blood glucose testing screened clients without a preexisting diagnosis of DM and A1c testing was obtained if elevated glucose levels were found and for those with a preexisting DM diagnosis. Measurable outcomes included: diabetic self-management behaviors, diabetic self-efficacy (individuals' perception of their ability to manage their DM) and medication adherence. The study reported significant improvement in mean A1c from baseline to follow up (8.11% to 7.96%, $p<0.01$). The proportion of participants with poor glycemic control (HbA1c >9 percent) declined from 28 % to 25% ($p<0.001$). Improvements were also seen in self-efficacy ($p<0.001$), DM distress ($p<0.001$) and medication non-adherence ($p<0.01$). However, the decline in severe hypoglycemic episodes did not reach significance.

Seligman, et al. (2018) also implemented a six-month diabetes self-management education (DSME) program tailored by study staffs (nurse and diabetes educator, dietitian, and physician) to address participant challenges to self-management (literacy, numeracy, transportation barriers and costs, food-access barriers, and food insecurity) (p.1228). The American Association of Diabetes Educators (AADE) Seven Self-Care Behaviors and components from the Type 2 Diabetes BASICS curriculum were used to guide the program. The six-month intervention was implemented using a sample size of 568 participants (285 intervention and 283 control). The intervention included blood glucose and A1c testing at months three and six, primary care referrals, diabetic self-management classes, educator one-on-one check-ins and twice-monthly diabetes specific food packages. The self-management program included two structured sessions and optional monthly one-hour drop-in sessions,

implemented by food pantry staff after being trained in curriculum delivery by a registered nurse and diabetes educator (Seligman, et.al, 2018). Also, written DM education materials, including simple, DM-appropriate recipes using foods, were included in the food packages. Brief one-on-one check-ins with clients during food distributions were also provided for self-management support. No significant A1c differences were seen between the intervention and control group at follow-up (9.12% in intervention vs. 8.88% in control; p =0 .16) (Seligman, et al., 2018). However, researcher observed increase in the percentage of participants having an A1C < 7.5% in intervention group at follow-up compared with control group, although they didn't find statistical significance (intervention 24% vs control 29%; p= .19) (Seligman, et al., 2018, p. 1229). Moreover, Seligman et al. (2018) further reported significant improvements among the intervention group relating to food/ FS (p =.03) and food stability (p=.01) and significant reductions in trade-offs between food and DM supplies (15.7 vs. 24.1, p = .03) when compared to the control group.

Grilo et al. (2015) implemented a two-group, six-month BP intervention composed of two behavioral modification interventions (home BP telemonitoring vs. home BP telemonitoring + telephone-based nurse case management) directed at food insecure adults. The home BP telemonitoring participants (Group A) were provided with a validated BP monitoring device and provided instructions on how to use the equipment. Group B was with the same validated BP monitoring device and guidance on use in addition to nursing case manager support. Both groups received educational materials on HTN and DM management, a call from the nurse case manager. to ensure they understood how to use the device. Self-report questionnaires and biometrics were obtained at baseline and six months for both groups (Grilo et al., 2015).

Group A obtained their BP twice a day, three days per week, with readings being transmitted to a secure central server and emailed to the patient's provider. Group B participants were contacted by a nurse case manager to schedule the counseling telephone calls (weekly for months one and two, biweekly for months three, and monthly for months four through six) (Grilo et al., 2015). These appointments conducted by the nurse case manager and included BP self-management education (diet, physical activity, weight loss; smoking cessation, stress reduction) medication and appointment reminders, self-monitoring of BP and blood glucose, and addressed medication adherence and barriers to behavior change. Problem-solving and motivational interviewing strategies were used to support behavior change efforts (Grilo et al., 2015).

A significant decrease in systolic BP was observed in both interventions among the FS participants ($b = -0.77$, $t = -4.35$, $p < .001$). In contrast, no significant impact on systolic BP was observed among FI participants ($b = 0.25$, $t = 1.52$, $p = 0.14$) (Grilo et al., 2015). The estimated drop in systolic BP throughout the intervention among FS participants was 9.2 mm Hg, whereas systolic BP increased by 3.1 mm Hg among food-insecure participants. Grilo et al. (2015) concluded that both intervention types were effective for improving BP in FS participants. However, the FI limitations to access healthy foods may have prevented the insecure food group from following the dietary guidelines, crippling the intervention's effectiveness (p.4).

Chronic disease management such as DM and HTN are challenging in FI population who is depending on the foods supply provided by regular food pantry because the foods provided from food pantries mostly do not meet the quality and nutrition for healthy diet with high carbohydrate and high sugar-containing foods. Empowering patients to prepare and select the healthier food within a budget and specific to disease, encouraging the healthy lifestyle from the sedentary lifestyle and chronic disease management skills; encouraging the medication

compliance, regular preventive and chronic disease management clinic visits; and incorporation of assistance for FI population through the availability and accessibility of health services and community resources are critical and should be done together to bring the improvement in glycemic control and better health outcomes.

Disease Specific Food Provision. Seligman, et al. (2015) utilized registered dietitians and certified DM educators to guide DM specific prepacked boxes of food sufficient to last one to two weeks to each participant. The boxes contained recipes and healthy cooking tips that correlated with the food provided in the boxes. The study resulted in increased fruit and vegetable intake from 2.8 servings per day to 3.1 servings per day ($p<0.01$) and improvement of Hgb AC1 from baseline A1C (8.11%) to follow-up (7.96%) ($p <0.01$). Among the subset group who had an A1c of 7.5% or greater at baseline, mean A1c declined from 9.52% to 9.04% ($p<0.001$). The proportion of participants having poor glycemic control with A1C > 9% was declined from 28% to 25% at post-intervention. Self-efficacy (score: 1-10), DM distress (score: 1-6) and medication non-adherence (score: 0-4) with higher numbers were also measured and analyzed, indicating greater efficacy, distress and non-adherence. Self-efficacy improved from 6.8 to 7.3 ($p<0.001$), DM distress declined from 3.1 to 2.7 ($p<0.001$) and medication nonadherence improved from 1.2 to 1.1 ($p<0.01$). Improvements were also seen in trade-offs between buying food or medicine from 47 at baseline to 36 at follow-up ($p<0.001$). However, no significance was observed in severe hypoglycemic episodes.

Seligman, et al. (2018) also provided diabetic specific food packages to a group of participants while the control group continued to receive regular food pantry services for six months. Participants were eligible to receive 11 diabetic approved food packages twice a month during the intervention. Food packages contained approximately 22 meals, or 20% to 25% of

monthly food needs, scaled for household size in anticipation of sharing. The outcomes measures included food security, food stability, fruit, vegetable, and sugar intake, hypoglycemia, food and medications/supplies tradeoffs. Statistically significant improvements were seen in the intervention group utilizing the disease-specific food packaging provision with improved food security (60 vs. 69.4, p= .03), better food stability (54.9 vs. 70.2, p= .01), increased fruit and vegetable servings per day (4.2 vs. 3.9, p=.04); and reduced tradeoffs between food and diabetes supplies (15.7 vs. 24.1, p=.03) when compared with the control group with regular food pantry provisions. No significant differences were observed in sugar intake or hypoglycemic events between the intervention and control groups (Seligman, et al., 2018). Additionally, 80% of the intervention group preferred the diabetes food package over the standard pantry offerings, and 98% reported the diabetic boxes were very or somewhat helpful (Seligman et al., 2018).

In conclusion, the literature review delineates a relational connection of FI with negative health outcomes. Dietary educational sessions incorporating hands-on cooking and exercise seem to improve healthier lifestyle and competencies to prepare and select the healthier diet within a budget and may improve outcomes in diet-sensitive diseases like DM, HTN and hyperlipidemia in food insecure populations, especially when education sessions were provided six or more sessions over 3-6 months. Yet there is a gap in the knowledge due to the lack of longitudinal research data to infer the causality and directionality of FI and chronic diseases and to identify the interventions and modality effective to sustain the long-term knowledge and competencies to prepare the healthier diet under the budget and to provide the long-term health outcomes.

Further research is needed to identify the interventions and modalities that are most effective in sustaining the long-term knowledge and competencies required to prepare healthier diets with limited food choices and a limited budget to improve long-term health outcomes.

Despite these gaps, opportunities for implementing disease prevention or management strategies in the food bank/pantry setting present a unique and promising potential in meeting the needs of vulnerable populations while improving health outcomes.

Chapter 3: Methodology

Implementation Plan

Study Design

This cross-sectional correlational community project design was to determine (a) the level of FI in individuals who use food pantries, (b) the relationship between FI severity and the demographic, socioeconomic, comorbidity, and health data. Also, a one group quasi-experimental pilot study with a pre-and post-intervention survey evaluated the feasibility and effectiveness of a one-on-one Zoom conferencing platform education session on a healthy diet and community resources for food, clothing, and housing assistance programs. The effects of the education sessions were measured by comparing pre-and post-survey scores on (a) knowledge, (b) awareness, and (c) intent.

Study Subjects/ Setting

A total of 40 participants were recruited and participated for this project who are aged 18 years or older who visited one of three pantries within the NRV region of Southwestern Virginia (May 1st, 2020 – July 15th, 2020): (a) Spiritual Roots Community Food Bank, (b) It's All About Jesus Outreach and Help Center and (c) The Giving Tree Food Pantry. Forty participants (n=40) were recruited for the study. Excluded were participants under the age of 18 years, and those lacking mental capacity. Due to the COVID19 social distancing order, the study implementation were moved from the food pantry settings to an online conferencing platform with telephone capabilities.

Spiritual Roots Community Food Bank, located in Christiansburg, VA was started by Addison and Beverly Taylor in 2002 as a soup kitchen and has since evolved into a large entity salvaging food from local grocery stores, merchants, farmers market and the Neighborhood

Harvest and distributing to people in need in Montgomery, Floyd, Giles, and Craig counties (The Dwelling Place Christian Fellowship, 2019). The food bank is located at the Dwelling Place Christian Fellowship Church and is solely operated by volunteers. The pantry does not require income eligibility but does restricts client use to once a month (T. O'Reilly, personal communication, July 22, 2019). The State's social distancing order for the COVID-19 pandemic modified the pantry's normal food distribution from client pantry entry and selection of desired foods to pre-boxed food provision distributed by volunteers to client vehicles. The food bank is open to clients every 3rd and 4th Wednesday of each month. The stakeholder contact is Tullio O'Reilly.

It's All About Jesus Outreach and Help Center, located in Radford Virginia, is a 501(c) organization established by Helen Blake in April 2009. (H. Blake, personal communication, January 4, 2019). According to Blake (2019), It's All About Jesus Outreach and Help Center is a Christian ministry that partners with Feeding America and is staffed by non-paid volunteers from various area churches three days per week. The organization provides food, clothing, prayer, counseling, and financial assistance to those in need. Monetary and food donations are attained from local food retailers, churches, businesses, individuals, and groups (H. Blake, personal communication, January 4, 2019). Before COVID19, the facility was open Tuesdays and Thursdays from 10:00 am -12:00 pm and Saturdays from 10:00 am -11:30 am. Compliance with state social distancing orders modified provision in pre-boxed food drive-thru approaches. There are no income eligibility requirements, and patrons are eligible to come weekly. The stakeholder contact is Helen Blake.

The Giving Tree Food Pantry opened in 2010 and is operated out of the New River Valley Community Church, located in Christiansburg, VA. The organization is a 100% volunteer

and donation powered food pantry that serves around 250 families monthly (The Giving Tree, 2019). They are affiliated with Feeding America and also obtain food provisions redistributed from local grocery stores and eateries, local gardeners, gleaners, farmer's markets, and farmers. The pantry is not income-based and is open to clients every Friday, with client use restricted to once every three weeks. During the current study, prepackaged food using a drive-thru approach complies with social distancing orders. The stakeholder contact is Kim Bowman

Study Process/Intervention

Informed Consent/Recruitment. Due to the COVID-19 pandemic social distancing mandates, modifications included a 'ZOOM teleconferencing' platform for education sessions. Recruitment occurred via flyers packets that were inserted into all food packages, by the food pantry staff, on the scheduled food pantry operating days. Recruitment flyers announced the purpose of the study, study procedure including education session and pre-and post-surveys, duration to complete survey, duration of education session, risks and benefits, and how to participate, listing the researcher's Google voice contact phone number and email address. All surveys were labeled with a random three-digit numerical code (ID) for identification. The food pantry subject contacted the researcher for participation, and the purposes of the study, study design, process, and all required documents, were explained in detail by the project researcher, and all questions answered. Once agreeable to participate in the study, the researcher read the consent form (Appendix D), and the participant verbalized their consent. The consent form located in the recruitment packets were not collected but for the participant to keep for their records.

***Baseline & Pre-Surveys*.** The baseline survey (Appendix F) collected data on (a) demographics and socioeconomics (b) health and behavioral history and (c) food security status

and severity level screener questions from the USDA Household Adult Household Food Security module. Also, a screener question for pantry use before COVID-19 was included to observe for new pantry users.

Baseline surveys were administered to participants by the project researcher over the telephone, informing them to follow along using their copy found in the recruitment packet. The researcher recorded the participant's response to the survey with the same ID number, pre-assigned on the study distributed. The completed questionnaires were placed in a designated 'baseline survey' folder and securely stored in a locked file cabinet. Next, the researcher administered the pre-survey over the phone and recorded the participant's responses on the survey with the matching ID number.

The pre-survey (Appendix G) gathered information on nutritional knowledge, attitude, and confidence. Completed pre-surveys were placed in a folder labeled "pre-survey" and placed in a locked cabinet.

Education Sessions. After the pre-survey was administered, the researcher explained how the education session would be provided and obtained the participants' preferred method. The participant had the option of accessing the education session, using their telephone to call in or using an internet-accessible smartphone, PC, or laptop to log into the face-to-face individual ZOOM online teleconferencing session. If the participants had a smartphone and preferred the ZOOM online teleconferencing platform, they were instructed on how to download the ZOOM application to access the education session. A link to join the education session room was sent either via text or email, based on participant preference. If the participant was unable to participate in the education session at the first phone encounter, they were given an appointed time to log on to the ZOOM or call for the education session at a later date. Participants were

told to identify themselves using their ID number when entering the meeting. If they did not remember their ID number, the researcher referred to the study information sheet.

Dietary education was provided as a 20-30-minute individual session using the ZOOM online conferencing platform. The teaching focused on how to eat healthier on a budget. It included dietary guidelines for fruits, vegetables, proteins, carbohydrates, grains, and dairy, with an emphasis on lowering sodium, sugar, and fat. The education also included pictures and visual cues to help improve participant understanding. All handouts provided were written at a fifth-grade level. In addition to dietary education, education on community resources was provided to each participant during the session by the researcher. Community resources consisted of local emergency assistance, soup kitchens, food/clothing banks, homeless shelters, housing assistance, SNAP, WIC, and free or reduced-cost healthcare clinics available in the local areas.

Post-Survey. Immediately following the educational session, the post-education survey (Appendix G) was administered by the researcher to measure the comprehension and the effectiveness of the tutorial session on healthy nutrition and community resources awareness and utilization. The post-survey repeated the inquiry of the pre-survey questions. The researcher recorded the participant responses on the post-survey with the matching ID number. Upon completion, the post-surveys were placed in a separate folder labeled “post-survey” and placed in a file box.

At the end of the post-intervention survey, the participant was referred to the ID index card found in the recruitment packet and informed to present it to the food pantry, in which they obtained the recruitment packet in exchange for a participation gift bag. The gift bag incentive included a facemask made by the researcher, healthy snacks (Appendix H), a copy of Eat Well on Four Dollars a Day Good and Cheap Cookbook (Appendix I), healthy nutrition tips handouts

(Appendix J) and a Community Resource Directory compiled by the researcher (Appendix K). A food pantry volunteer was assigned to the distribution of gift bags.

Human Subject Protection & Data Security

Institutional Review Board (IRB) approval and informed consent was obtained prior to the implementation of the project and data collection. After obtaining the participant's email or phone number, a ZOOM link for accessing the education session was either sent via email or by text to the phone number provided. This information was recorded in a log and de-identified by matching the ID number from the recruitment packet materials, reported by the participant. The email/telephone logged information was kept in a folder separate from all other study data.

The informed consents were prepackaged in the recruitment packet for participant records. The researcher instructed the participant to take the consent form from the recruitment packet and follow along as the researcher read it via telephone. Once the details of the study had been explained, and all questions answered, the participant verbalized their consent, the ID number listed on the recruitment documents was written on the informed signature line with the researcher's signature and date. The researcher then recorded the participant's ID number on the consent form copy, along with the researcher's signature and date. The researcher informed each participant that the consent form in their recruitment packet was for their records and will not need to be turned in. The verbal consents with the participant study ID number, researcher's signature, and date were put in a folder labeled "informed consents" and placed in a separate file box. No personal identifying information was collected on the consent form. The numerical code became the only identifier of records for all participants. All other surveys and questionnaire coded data sets were kept in a locked file cabinet.

All electronic research data was saved in a Radford University secured H drive on a password-protected computer. The computer has a password-locked screensaver and installed with the latest antivirus software and firewall protection. Study data was backed up on an encrypted external hard drive, stored in a separate location from the computer, accessible by only the researcher. All the data files related to the study will be retained at Radford University in a locked file cabinet for three years from the study completion date. After three years, the data will be deleted by using a utility tool that overwrites every sector of the hard drives.

Study Tools

The following survey tools will be used, some of which will be modified from the original form. Copyright permission has been obtained for all study tools and surveys prior to implementation (Appendix L).

***Demographic/ Socioeconomic Survey*.** Baseline data were obtained using a modified questionnaire created from the 2018 *Behavior Risk Factor Surveillance System (BRFSS)* (Centers for Disease Control and Prevention [CDC], 2018) (See Appendix Q). The *BRFSS* was established in 1984 by the CDC to organize the State Database about U.S. residents regarding health-related risk behaviors, chronic health conditions, and, use of preventive services (CDC, 2014). It is one of the largest continuously conducted health survey systems in the world, and numerous studies have investigated the reliability and validity of the tool, confirming it as a valuable source for obtaining information (CDC, 2014). The *BRFSS* is comprised of an annual standard core, a biannual rotating core, optional modules, and state-added questions (CDC, 2014). According to the CDC (2018), "the fixed core is a standard set of questions asked by all states that includes questions on demographic characteristics, plus queries on current health behaviors, such as tobacco use and seatbelt use. The rotating core is made up of two distinct sets

of questions, each asked in alternating years by all states, addressing different topics" (para. 4). The BRFSS materials are available in the public domain, and its use is encouraged. However, the baseline survey for this study was created from *BRFSS* Core Section-8- Demographics with questions that are answered using methods of select one, select all that apply, and yes or no relating to socio-demographic, health, and comorbidities.

***Food Security Survey*.** The USDA Household Adult Food Security Survey Module (AFSSM) (See Appendix M) was used to define the presence and severity of FI among participants. The USDA was contacted for copyright permission, and the researcher was informed that no consent was needed as the AFSSM is public domain, and use was encouraged. Food security status is classified as FS, MFS, LFS, and VLFS based on the AFSSM scoring measures (USDA, 2019). The AFSSM can be implemented as a three-stage design using screeners to keep the respondent burden to a minimum needed to get reliable data (USDA, 2012). The AFSSM used in this study consisted of 10 questions with one preliminary screener question, which helped to reduce the respondent burden of high-income households. The remaining nine items were separated into stages based on the progression of FI. The AFSSM has been shown effective in identifying food-insecure households and households with VLFS with reasonably high specificity, sensitivity, and minimal bias. (USDA, 2012).

According to the USDA (2019), the AFSSM can be analyzed on a continuous linear food security scale (0-10), which measures the degree of severity of FI/hunger experienced by households. The sum of affirmatives can be used to determine the household's raw score and assigned as follows: HFS (0), MFS (1-2), LFS (3-5), and VLFS (6-10) (USDA, 2012). AFSSM interviewing is estimated to take less than four minutes. The multiple indicator questions in the

AFSSM capture and distinguish the various levels of FI severity with which the phenomenon of food insecurity/hunger is experienced in U.S. conditions (USDA, 2012).

Dietary Education Tools. The dietary educational components were formulated using the 2015–2020 Dietary Guidelines for Americans along with *MyPlate* recommendations (USDA Center for Nutrition Policy and Promotion [CNPP]; U.S. Department of Health and Human Services [HHS] and USDA, 2015). Appendix N provides an overview of the *2015–2020 Dietary Guidelines for Americans* content. According to the USDA, Center for Nutrition Policy and Promotion (2011), *MyPlate* was introduced along with the USDA dietary guidelines for Americans, and the program initiated the *MyPlate* icon to offer a visual cue that serves as a reminder for healthy eating (CNPP, 2011). A summary of *MyPlate* guidelines can be seen in Appendix O. *MyPlate* was used to discuss the five major food groups, their benefits, the recommended servings (CNPP, 2019).

A modified version of the *Health Educator's Nutrition Toolkit: Setting the Table for Healthy Eating (HENT)* (Appendix P) was also used to guide the education in this project (U.S. Food and Drug Administration [FDA], 2019). The *Toolkit* is designed to help providers educate individuals on how to make healthier food choices and offers a wide range of resources, including realistic tips on how to shop for and prepare food as well as order food when eating out to build a healthy diet (FDA, 2019, para.1).

Again, dietary education included topics of healthy meal planning on a budget, how to improve nutrition, and read food labels. Posters and handouts developed by the CNPP (2011) were used to enhance knowledge and encourage healthy eating. The CNPP, NIH, USDA, and HHS materials are public domain, free to use without copyright, and were ordered via the website and or downloaded and printed for use in the study. The education outline and contents

to be covered were drafted by the DNP student researcher, revised and approved with the feedback from the project faculty members and the content experts.

Diet Education Pre-and Post-Survey. An eight-item survey questionnaire was used in this study to evaluate the educational effects on knowledge (five items), attitude (one item), and confidence (two items) for healthier diet before and after the diet education. This questionnaire was created from the 15-item *Pre-and-Post-Tests* found in the *HENT* Pre-and-Post Tests. Five questions inquired about key *MyPlate* nutrition concepts (food groups, serving size, healthy food choices, and foods to avoid). One question asked about the attitude towards healthy nutrition, and two questions inquired about confidence in reading food labels and preparing meals on a budget. The second part of the survey was directed at community resources (awareness usage and plant intentions of use) relating to food, housing, diapers, and clothing low cost/free health cares

Stakeholders.

The stakeholders of this project included Sigma Theta Tau International Honor Society of Nursing-Epsilon Phi Chapter, Spiritual Roots Community Food Bank, It's All About Jesus Outreach, and Help Center, and The Giving Tree Food Pantry. Letters of support from the stakeholders can be found in Appendix R1-R3.

Timeline

The timeline associated with the project implementation was initially planned to commence over one year, beginning May 2019 with projected completion by May 2020. The original proposal was submitted to IRB, February 12, 2020, and approved on February 27, 2020. Project recruitment began on February 28, 2020, with the date of project implementation planned for March 20, 2020. However, the project came to a halt and required modification for

application under the State's COVID-19 social distancing. Thus, an IRB modification request was submitted on April 17, 2020, and was approved on May 1, 2020, for implementation (Appendix S). Project recruitment and deployment began May 1st, 2020 and was completed July 7th, 2020. Data review, statistical analysis, and project findings were complete by July 20th, 2020. The dissemination of this DNP Final project is projected to occur at *the 2021 American Association of Nurse Practitioners (AANP) National Conference* pending Abstract acceptance. Additional dissemination of the research findings will be submitted for publication to *The Journal for Nurse Practitioners* and to the *Preventative Medicine* journal, with publication pending acceptance.

Budget Plan

The COVID-19 modified budget for implementing the project was $1214.00 (Appendix T). Sigma Theta Tau International Honor Society of Nursing-Epsilon Phi Chapter approved the budget on April 28, 2020, to support the implementation of this project. This project will be fully reimbursed once all receipts and grant requirements are submitted.

Evaluation Plan

Study Variables

A compilation of the study variables are found in Appendix U. Variables gathered at baseline included socio-demographic data (age, gender, race, household size, education, health insurance, employment, income level, transportation, internet access, new COVID-19 pantry use and co-morbidity data (DM, HTN, HC) FI severity score, and health behavior health data.

The pre-and- post study outcome variables of the educational intervention included (a) knowledge and confidence on a healthier diet, (b) awareness and utilization intent for community resources (SNAP, WIC, food/clothing/housing assistant program, and healthcare access).

The pre-intervention data was compared to the post-intervention data to determine if there was an improvement in (a) knowledge and confidence for healthier diet preparation on a limited budget and (b) the awareness of community resources on food, clothing, and housing assistant programs increased and (c) if there was intent to use these resources.

Statistical Analysis Plan

Descriptive statistics, including percentages and frequencies, were used to describe the nominal variables on socioeconomic, demographic and clinical dat. Mean, and standard deviation (SD) were used for continuous variables to measure the severity of FI and the scores for the baseline and post-intervention knowledge, attitudes, and confidence of eating healthier, in addition to the community resource awareness and usage intent.

Pearson's r test was used to analyze the correlation between FI severity scores and each socioeconomic and demographic variable and the baseline knowledge/confidence scores on a healthy diet and community resources. Paired t-test was used to evaluate whether pre-post differences were significant in knowledge on nutrition, perceived confidence to prepare or select a healthier diet and reading food labels, and awareness and utilization of community resources. An integrated suite of software facilities, statistical language, and an environment known as R was used with a two-tailed test, with an alpha of 0.05 (Zhang, 2015).

Chapter 4: Results

Demographic, Socioeconomic, and Comorbidity Characteristics

Demographic Characteristics. Participants in this study were from a convenience sample (n=40) of adults (18 years+) recruited from three food pantries within the NRV, over an eleven-week time frame from May 1st to July 7th, 2020. The study consisted primarily of females (70%), followed by males (27.5%), with 7.5% identifying as transgender (Table 1). The average age was 47 years with the largest group of participants being between 35 and 54 years (35%), followed by young adults (18-24 years) (25%), adults in the 55 to 64 -year group (20%), adults over the age of 65 years (15%) with only 5% being between 25 and 34 years of age. The sample population was mildly diverse, with the larger population being Caucasian (57%), 17% were African American, 9% reported being of Hispanic ethnicity, and the remaining participants reported being in the category of "other" race (17%). Fifteen individuals (37.5%) reported having either a general education degree (GED) or high school education, 25% were reported to have a 9th to 11th-grade level, 17.5% reported some college or technical training, 12.5% were college or technical school graduates, and 7.5% had less than an 8th grade level of education.

Table 1. ***Demographic Characteristics***

Demographic Characteristics			
		#	**%**
Gender	Female	28	(70%)
	Male	11	(27.5%)
	Transgender	3	(7.5%)
Age	Mean Age - 47 years		
	18 -24 years	10	(25%)
	25-34	2	(5%)
	35-44	7	(17.5%)
	45-54	7	(17.5%)
	55-64	8	(20%)
	65 or above	6	(15%)
Race	Caucasian	24	(57%)
	African America	5	(17%)
	Hispanic	4	(9%)
	Others	7	(17%)
Education	College/Technical School Graduate	5	(12.5%)

	Some College/Technical Training	7	(17.5%)
	General Education Degree/High School Diploma	15	(37.5%)
	9^{th}-11^{th} Grade	10	(25%)
	< 8^{th} Grade	3	(7.5%)

Socioeconomic Characteristics. The more substantial majority of the sample (N=40) were employed either full time (35+ hours) (30%) or part-time (less than 35 hours) (12.5%), with 12.5% reporting being laid-off, 20% unemployed, 20% disabled and 5% were retired (Table 2). Overall, most of the sample had housing, with only two individuals reporting homelessness (5%). Most participants reported living in either apartment (27.5%) houses (25%) or mobile homes (22.5%) with a moderate amount reporting "other" as their housing status (17.5%). Households with three or four members made up the most significant part of the sample (47.5%), followed by houses with one to two members (37.5%) and 15% reported five or more living in the same household. Annual income levels among food pantry households were widely varied, with 17.5% reporting incomes greater than $40,000, half of the sample reported income levels between $20,001 and $40,000, 17.5% reported low range income levels ($5,001-20,000) and 15% reported less than $5,000 of annual income. A large portion of the sample was uninsured (37.5%), 25% stated Medicaid, 17.5% reported other types of insurance, 10% had Medicare, 7.5% were dual enrolled having both Medicaid and Medicare. Less than 3% reported having either Medicare or Medicaid in addition to other types of insurance.

Table.2. ***Socioeconomic Characteristics.***

Socioeconomic Characteristics			
		#	**%**
Employment	Full Time (+35 hours)	12	30%
	Part Time (<35 hours)	5	12.5%
	Being Laid-off	5	12.5%
	Unemployed	8	20%
	Disabled	8	20%
	Retired	2	5%
Living Setting	Living in Apartment	11	27.5%

	Living in House	10	25%
	Living in Mobile Home	9	22.5%
	Others	7	17.5%
	Homeless	2	5%
Household #	1-2 members	15	37.5%
	3-4 members	19	47.5%
	5 or more members	6	15%
Annual Income Level	< $5,000	6	15%
	$5,001 - $10,000	4	10%
	$10,001-$20,000	3	7.5%
	$20,001 - $30,000	11	27.5%
	$30,001-$40,000	9	22.5%
	< $40,001 or more	7	17.5%
Insurance	Uninsured	15	37.5%
	Medicaid	10	25%
	Medicare	4	10%
	Other	7	17.5%
	Medicaid + Medicare	3	7.5%
	Medicaid or Medicare + Other	1	2.5%

Comorbidities & Health Behavior Characteristics. Approximately 60% of the sample (n=40) reported having a chronic disease (DM, HTN, HC) (Table 3). Among those reporting a chronic disease (n=24), 25% reported DM, 25% had HTN and 17% reported HC, and 54% reported having a combination of these diseases (DM, HTN, HC). Approximately 1.6% of the sample (N=24) reported having two of the chronic diseases (DM, HTN, HC) and 3.7% reported having all three of the disease (DM, HTN, HC). Among those reporting a combination of diseases (n=13), one individual reported DM with HTN and three individuals reported DM with HC, making up 30.7% of the overall sample. Approximately 69% of the sample (n=13) reported DM and HTN and HC. Roughly 59% of participants (n=39) were taking medication for one of the three diseases (DM, HTN, or HC) and of those reporting medication use (n=23): (a) 30% reported DM medication use, 22 % were taking HTN medication, and 48% were taking

medication for all three diseases (DM, HTN, HC). Among those 23 participants who reported medication use for one of three diseases, 74 % reported that they had to choose between food or medicine in the past three months. Food and medication tradeoffs on at least one occasion during the past three months was reported by five individuals (29.4%) and 70.6% of the sample (n=17) reported food and medication trade-offs on two or more occasions in the past three months. Roughly, 65% of the overall sample (n=40) had not received preventative care in the past three months, and close to half (47.5%) of this sample reported using emergency services and or hospitalization in the past six months.

Table 3. ***Comorbidity and Healthcare Behavior Characteristics***

Comorbidity and Health Behavior Characteristics			
		#	**%**
Chronic Disease N=40	Yes	24	60%
	No Disease Reported	16	40%
Disease Types N=24	Diabetes	6	25%
	Hypertension	4	17%
	High Cholesterol	1	4%
	Combination of DM/HTN or HC	13	54%
Two Diseases N=24	DM and HTN or HC	4	1.6%
Three Diseases N=24	DM and HTN and HC	9	3.7%
		#	**%**
Diabetes + one disease N=13	DM and HTN (1) DM and HC (3)	4	30.7%
Diabetes + two diseases N=13	DM and HTN and HC	9	69%
		#	**%**
Taking Medication for DM or HTN or HC N=39	Yes	23	59%
	No=Not taking Medication	16	41%
		#	**%**
Medication Types N=23	DM Medication	7	30%
	HTN Medication	5	22%
	HC Medication	0	0
	DM or HTN or HC Combo	11	48%
Taking Medication Combination N=11	DM+HTN	0	0
	DM +HC	2	18%
	HTN +HC	0	0
	DM +HTN +HC	9	82%
		#	**%**
Did not take Medication due to cost in past 3 months N=39 *Any medications-not just DM/HTN/HC	Yes	15	39%
	No	18	46%
	Don't know	2	5%
	No Meds Prescribed	4	10%
		#	**%**

Food and Medication (DM/HTN/HC) trade-offs in past 3 months N=23	Yes	17	74%
	No	6	24%
		#	%
Number of occurrences for Food/Medication tradeoffs in past 3 months N=17	1 Occasion	5	29.4%
	2 or More Occasions	6	35.3%
	3 or More Occasions	6	35.3%
		#	%
Preventative Care in past 3 Months N=40	Preventative Care	14	35%
	No Preventative Care	26	65%
		#	%
ER or Hospitalization past 3 months	Yes	19	47.5%
	No	21	52.5%

Factors Contributing to Food/Healthcare Access. Half of the sample (n=40) had their own personal vehicle for transportation, 32.5% reported other methods of transport, walking was the primary method reported by four individuals (10%), and public transportation (bus) was cited by 7.5% of the participants (Table 4). No participants reported using Uber or Lyft as a significant method of transportation. Internet access was reported among 11 households (27.5%) except for one participant who did not provide an answer to the survey. Over half (77.5%) of the food pantry sample reported having a cell phone with internet capability. The primary method of implementation for this study was provided via telephone, with 40% provided via the ZOOM online conferencing platform.

Table 4. ***Factors Contributing to Food Access & Healthcare Access***

Factors Contributing to Food/Healthcare Access			
		#	%
Transportation N=40	Walking	4	10%
	Vehicle	20	50%
	Public Transportation (Bus)	3	7.5%
	Other Method	13	32.5%
	Uber or Lyft	0	0%
		#	%
Smart Phone Access **N=40**	Yes	31	77.5%
	No	9	22.5%
Home Internet Access **N=39**	Yes	11	28%
	No	28	72%
Food Pantry Use Relating to COVID-19 and Education Methods			
		#	%
Food Pantry Use Prior to COVID-19 N=40	Yes	27	67.5%
	No	28	32.5%
		#	%

Methods of Education Delivered N=40	Zoom Phone	16	40%
		24	60%

Food Insecurity Characteristics

The USDA Adult Household Food Security Survey Module food sufficiency screener question was used to assess for FI, and the 10- item version (10-point score) was used to determine the severity of FI among the study sample of food pantry participants. Participant responses of "yes," "often," "sometimes," "almost every month," and "some months but not every month" were coded as affirmative with one point given for each affirmative response (USDA, 2018). The household's raw score reflects the sum of affirmative responses given to the AFSSM 10-questionnaire (USDA, 2018). FS level was determined by the participant's household raw score: HFS (0), MFS (1-2), LFS (3-5), and VLFS (6-10). Overall, 67.5% of the sample had VLFS, and 27.5% were considered to have LFS (Table 5).

Table 5. Levels of Food Security

FS Level	Frequency	Percentages
High Food Security	0	0%
Marginal Food Security	2	5%
Low Food Security	11	27.5%
Very Low Food Security	27	67.5%
Totals	40	100%

Correlation between FS and Socio-Demographic/Comorbidity Characteristics

Linear regression was conducted to evaluate whether there were associations between FS status and each socio-demographic, comorbidity, and health behavior variables. Using the raw FS score, a strong negative linear correlation (-0.497) was observed between FS status and household income (t=-2.30, p=0.030), indicating high food insecure individuals are likely to have the lower household income. Furthermore, the findings showed that individuals with low food security have a significant positive linear correlation with unemployment (0.397, t=2.128,

p=0.040), the higher number of household members (1.29, t= 2.428, p=0.020) and more likely to make food-medication tradeoff (0.831, t=2.730, p=0.01). Similar findings were observed when using the severity level of food insecurity as the categorical variables.

Table 6. Food Insecurity Correlates

Variable	Parameter (=Correlation)	SE	*t* value	*p* value
Employment	0.397	0.187	2.128	0.040
Household #	1.249	0.514	2.428	0.020
Income Level	-0.497	0.216	-2.30	0.030
Food/Med Tradeoffs	0.831	0.304	2.730	0.010

Effects of Healthy Diet Education: Knowledge, Attitude, and Confidence

The pre- and post-survey with the 8-item questionnaires were used to measure participants' knowledge, attitude, and confidence, having a total score potential of 26-points. Participant knowledge of healthy food was measured based using five questions (#1-5) with the maximum score of 11 points. The sixth question were used to measure participants' attitude towards eating healthier with one to five Likert scale. Questions seven and eight measured participant confidence and ability to read a nutrition label and prepare a healthy meal under four dollars with responses of "not confident," "somewhat confident," "neutral," "confident" and "very confident," with participant selection of "very confident" given the highest point value (1-5 points).

A paired t-test analysis of each variable was performed to determine if the provision of one healthy nutrition education session would improve food pantry user knowledge, confidence, and attitude towards healthy eating. The paired t-test analysis found no significant improvements in the food pantry attitude for eating healthier post-intervention (p=0.090) Table 7). Yet substantial increases were seen between the Mean pre-and post-intervention, respectively, for overall knowledge of healthy nutrition (6.45 vs. 10.05, p<0.001), and total confidence in reading

food labels and ability to prepare healthy meals on a $4 budget. (4.375 vs. 5.7, p<0.001) (Table 8).

Table 7. Effects of MyPlate Education on Healthy Diet Knowledge (Pre and Post Score)

Variable	Mean SD Pre	Mean SD Post	*df*	*t*	*P* value
Food	10.125 ± 6.13	24 ± 3.18	13.875	14.793	1.38E-17
Housing	1. 9 ± 3.201	9.1 ± 3.733	7.2	10.886	2.18E-13
Diaper/Clothes	3. 2 ± 2.053	8. 05 ± 1.011	4.85	15.903	1.22E-18
Healthcare	4. 45 ± 3.154	11.125 ± 1.823	6.675	12.702	1.94E-15
SNAP/WIC	1.65 ± 0.586	1.975 ± 0.158	0.35	3.557	0.001
Totals	19.75 ± 12.235	52.3 ± 7.240	32.55	18.106	139E-20

Table 8. Effects of MyPlate Education on Attitude and Confidence Level- Pre and Post Score

Variable	Mean SD Pre	Mean SD Post	*df*	*t*	*P* value
Food	10.125 ± 6.13	24 ± 3.18	13.875	14.793	1.38E-17
Housing	1. 9 ± 3.201	9.1 ± 3.733	7.2	10.886	2.18E-13
Diaper/Clothes	3. 2 ± 2.053	8. 05 ± 1.011	4.85	15.903	1.22E-18
Healthcare	4. 45 ± 3.154	11.125 ± 1.823	6.675	12.702	1.94E-15
SNAP/WIC	1.65 ± 0.586	1.975 ± 0.158	0.35	3.557	0.001
Totals	19.75 ± 12.235	52.3 ± 7.240	32.55	18.106	139E-20

Effects of Community Service Awareness Education

The investigator created the community resource pretest and posttest with tables related to available resources for food (max 26 points), clothing and diapers (max 9 points), housing (max 11 points), and healthcare (max 12 points), categorized by location. Participant awareness and intent were scored based on the number of resources they reported awareness of at baseline and post-intervention and the post-intervention number of resources they planned to use in the next three months.

A paired t-test analysis was conducted to evaluate both community resource awareness and usage intention for community resources. The analysis found statistical evidence of increases in awareness and usage intentions between the pre-and-post-intervention.

Overall awareness about community resources increased between pre-and-post intervention, respectively (19.75 vs. 52.3, p<0.001) (Table 9). Further analysis of the categorical

related resource awareness, remained significant with the federal programs (SNAP/WIC) (0.1,625 vs 1.975, p=0.001), food (10.125 vs. 24, p<0.01), housing (1.9 vs. 9.1, t=10.886, p<0.001), clothing and diaper assistance (3.2 vs 8.05, p< 0.001); and free/low-cost health care assistance programs (4.45 vs 11.125, p<0.001).

Table 9. Effect of Education on Community Resource Awareness- Pre and Post Scores

Variable	**Mean SD Pre**	**Mean SD Post**	***df***	***t***	***p*<0.05**
Food	10.125 ± 6.13	24 ± 3.18	13.875	14.793	1.38E-17
Housing	1. 9 ± 3.201	9.1 ± 3.733	7.2	10.886	2.18E-13
Diaper/Clothes	3. 2 ± 2.053	8. 05 ± 1.011	4.85	15.903	1.22E-18
Healthcare	4. 45 ± 3.154	11.125 ± 1.823	6.675	12.702	1.94E-15
SNAP/WIC	1.65 ± 0.586	1.975 ± 0.158	0.35	3.557	0.001
Totals	19.75 ± 12.235	52.3 ± 7.240	32.55	18.106	139E-20

The use of community resources prior to the education was low in food, clothing/diapers, housing, and free/low-cost healthcare. This study observed that overall usage intentions of community resources significantly increased after education (1.7 vs 10.425, p=0.001) (Table 10). Statistical significance was consistently observed at the intention to use community resources for food (1.75 vs 5.6, p<0.01), housing (0.125 vs 1.15, p=0.009), diapers and clothing (0.125 vs 1.95, p<0.01), and free/low cost healthcare (0.35 vs 1.725, p<0.01). However, no significance was found in utilization intent for federal programs (SNAP/WIC) (0.375 vs 0.626, t=2.912, p=0.60).

Table 10. Intention to Utilize New-found Community Resources

Variable	Mean SD Pre	Mean SD Post	df	t	p<0.05
Food	1.75 ± 1.26	5. 6 ± 3.33	0.25	7.144	p<0.001
Housing	0. 125 ± 0.335	1.15 ± 2.315	1.025	2.748	p=0.009
Diaper/Clothes	0.125 ± 0.404	1. 95 ±1.319	1.825	9.652	p<0.001
Healthcare	0.35 ± 0.736	1.725 ± 1.132	1.375	6.520	p<0.001
SNAP/WIC	0.375 ± 0.540	0.625 ± 0.540	0.25	2.9	p=0.6
Totals	2.375 ± 1.821	10. 425 ± 5.411	8.05	9.191	p<0.01

Chapter 5: Discussion

Correlation between FI Severity and Socio-Demographic Characteristics

Among 40 participants, one out of five participants reported that they started to use food pantry to meet their financial needs. It is obvious that COVID-19 pandemic results in more financial burdens to more population. However, no specific correlation was found in this study between FI severity and age, gender, race and education backgrounds as well as whether they ever used food pantry before or after COVID-19.

The strong negative relation was observed between FI severity and income in this study, which is not surprising as revenue is one of the most important determinants of health inequality because it limits an individual's ability to acquire healthy food and utilize the healthcare and medicine. Similar findings were observed in The 2011 NHIS population-based sample analysis in two separate studies. Venci and Lee's (2018) study reported a link between FI and low incomes less than $34, 9999 and observed that the severity of FI, specifically LFS and VLFS, were strongly linked to the low income ($p<0.0001$). Knight et al. (2016) also a significant negative correlation between FI and incomes below the federal poverty guideline (<100%) ($p<0.0001$).

Correlation between FI Severity and Comorbidities/Health Utilization Characteristics

Approximately 60% of the overall sample (n=40) reported having at least one chronic disease (DM, HTN, HC) and of those reporting these diseases (n=24), 54% had a combination of chronic diseases (DM, HTN, and HC). Of those 23 participants 52% reported taking prescribed medications for at least one of their chronic diseases and 48% reported taking a medication for DM, HTN and HC. Among 40 participants, only 35% had received preventive care and 47.5% reported using ER or a hospitalization in the past six months. Food-medication tradeoff

behaviors are commonly observed in the food insecure population. In this study, among 23 participants taking medications, approximately 74% had experiences of food-medication tradeoffs in the past three months. Comparable findings related to the food/medication tradeoffs and its relationship with FI severity were reported by Bomberg, et al. (2019), where 67% of their study subjects reported medication nonadherence. Silverman, et al., (2015) also found that in their multicenter survey study, 52% of participants reported making a "choice between paying for food and medicine/medical needs". Food and medication tradeoffs have observed increasing significantly along with FI severity, specifically in VLFS group (Venci and Lee, 2018).

Effects of Healthy Diet Education Sessions & Community Resource Awareness Session

The *MyPlate* dietary education intervention provided in this current study has proven to be an effective method of improving food pantry users' knowledge of healthy foods in the several studies. Driver and Frieson (2016) reported an increase in overall knowledge score between pre and post-intervention with *MyPlate* education ($t=2.82$, $p=0.010$). The results from this current study also indicated that educational interventions among food pantry populations were feasible and also resulted in improved nutritional knowledge and confidence to read food label and prepare the healthy foods.

There is lack of researches on community resource awareness education. This current study is one of few studies that utilized food pantry approach and incorporate community resources awareness intervention in addition to diet education. Our study found that most of the participants were aware of and used at least two free food supporting programs or centers but none of them reported that they have used for clothing, diaper, housing, or free clinic resources prior to the education. This community resource awareness intervention of this study was shown to be effective to significantly improve awareness of local resources support programs (19.75 at

pre vs. 52.3 at post for total community awareness score, $p < 0.001$) but the increase of intent to use these newfound resources were somewhat moderate (2.4 at pre vs. 10.4 at post for total community resource utilization score, $p < 0.001$) but these population showed being able to locate and planning to use one or more local community resources for all local programs including foods, clothing/diapers, housing, and free health clinic services except federal program (i.e., SNAP or WIC). The lack of increased intention to utilize the federal programs could be due to the strict eligibility requirements and or the burden of having to complete the eligibility application paperwork, which can be daunting to vulnerable populations.

Education Delivery Methodology: Online/Telehealth Education Session

This nutrition education /community resource intervention was initially planned as a group education session, which was to include on-site recruitment and be implemented at each food pantry. However, the COVID-19 pandemic required significant modifications to move forward with the study. The method of recruitment and implementation moved from an onsite face-to-face intervention to an individual online ZOOM platform, with the option of telephone education access. This study is the first study that used online/telehealth methods to educate food insecure population and measure its effectiveness to improve knowledge, attitude, and confidence to prepare the healthy foods and to increase the knowledge and intention to utilize the community resource education. In this study, the use of individual education using online telehealth videoconferences and or phone-calls was shown to be effective to improve knowledge and confidence of preparing and eating healthy food and to improve the intention to utilize community resources.

However, there was great concern if this food insecure population would participate without the face to face interaction, if they would have the aptitude to access online education

and if the instruction could be executed in a manner in which participants could understand. Indeed, in this study, Many of the food pantry users struggled with downloading the ZOOM application, in addition to understanding how to maneuver the audio and video components. Another concern elicited by many participants was regarding the safety of downloading an education-session application they knew nothing about. Internet stability also played a role as often the sessions would freeze or lose connection. In this project, only 40% of participants preferred and were able to successfully download the app and receive the education through on-line.

The alternative option, providing education via telephone, was offered in this study when the participants experience difficulty to access online videoconferencing education session. In this study, more than half of participants (60%) end up using phone as the method of education. Yet, implementing education via phone encountered with new challenges of participant distractions and failure to understand the material, as the illustrated methods such as figures or photos used to enhance learning and concentration were not available as the video-screen format to see the screen together at the same time. Rather, in this method, the participants was only able to access the printed materials provided in the recruitment package and should follow the instruction to locate the relevant figures and contents over the phone to over materials together for education session. Providing education via telephone was feasible; however, the educational sessions often extended the projected beyond the 30-minute session, because material constructs had to be repeated or further explained due to the lack of visual components.

COVID-19 pandemic accelerates the advance in telehealth medicine and telehealth medicine has been shown as the effective methods to reach out the rural population. Our study showed 75% of this population carries a smartphone indicating internet access. And, this study

showed the feasibility and effectiveness of education sessions, even using the online video-audio conferences. The use of videoconferencing can be a plausible method to access this population to provide healthy lifestyle education, to empower and interact with patients to monitor their health condition, and to provide federal and local community resource information for foods, clothing/diaper, housing, and free health care.

Impact of COVID-19

Despite the great concern whether this population would participate without the face to face interaction and a fair number of these food pantry users (n=40) contacted the researcher to participate using the phone number on the recruitment flyer during the eleven weeks of study periods. The COVID-19 pandemic impacted many of the study participants, which may have played to the number of study participants in recruitment of this study as social distancing orders mandated by the state resulted in many of these individuals being isolated at home without social connections or distractions of typical daily interactions.

Many of the participants in this study reported loneliness, anxiety, fear, and concern for safety due to the prolonged social distancing. They also expressed the concerns for current difficulties and future abilities to obtain food and other necessities due to the government shutdown of many organizations and the pending loss of employment. Participants reported relief in having the ability to contact a health professional directly to express their concerns by being able to participate the study and to inquire further about measures of COVID-19 safety, nutrition, and resources in addition to inquiries about disease-specific foods and other nutritional content questions.

Evaluation of the Ecological Model

The Ecological model and the SCT being used as this study' framework provided a solid foundation for this study, which contributed to the success of the study. These frameworks supported to gain a more comprehensive understanding about the factors influencing FI behaviors and what may be necessary to alter those behaviors. The process of understanding individual choices and contributors including both barriers and motivators which affect that person, confirmed that providing healthy dietary education using *MyPlate* was a valuable measure for improving both knowledge and confidence among the food pantry sample. These components helped increase the food pantry user's perceived level of situational self-efficacy, while simultaneously influencing their persistence to improve their health (Glanz, Rimer and Viswanth, 2015). According to Doerksen, and McAuley (2014), individuals having higher levels of self-efficacy, believe that with the motivational effort they can overcome the barriers to certain behaviors.

Providing food insecure individuals with education alone, to change food pantry user behavior would not have been as effective if the environmental conduciveness for healthy behaviors failed to be addressed (Glanz, Rimer and Viswanth, 2015) To combat the environmental barriers, SCT guided the necessity of a community resource session to improve health outcomes in this specific food insecure population. In this study, the community resource education session introduced an awareness for alternative support measures to offset some of the obstacles and burdens these populations may encounter daily in modifying their health behaviors. The SCT further guided the provision of the study incentive. The provision of the cookbook with recipes for preparing healthier meals under four dollars, nutritional tips for eating healthier on a budget, reading food labels and measures to extend food budgets, providing lists of local community resources for foods, clothing, diapers, housing, and free healthcare clinic, and

providing hand-made masks during COVID-19 pandemic, which serve as a measure for healthy behavior reinforcement and helps to maintain goal-directed behaviors over time (Glanz, Rimer and Viswanth, 2015).

Limitations

Several factors may have limited the generalizability of this study. The social isolation aspect of the COVID-19 pandemic may have been a factor of influence on participation. Providing food pantry users with free access to a health professional in times of pandemic offered additional incentives and motivation to a vulnerable population to volunteer to participate in study. It is possible that in the regular social situation, these participants were not forthcoming about struggles and sensitive topics, such as lack of income, and homelessness, which are often combined with stigmas. These factors may also affect the study's generalizability. Individual education session, rather than group session, allowed individual interaction over the phone or Zoom videoconferencing, obtaining sensitive data, and informing participants they did not have to answer questions that made them feel uncomfortable and it helped to reduce the possibility being reluctant to participate to the educational session. This educational methodology should be considered for the future studies to reach out these population.

A small sample size, convenience sample, and respondent and or researcher bias also have the potential to reduce the generalizability of this study's findings. Especially, often the researcher of this project would go over the research survey questionnaires over the phone to support the understanding of the questions for the participants to complete the survey, rather than asking them complete the survey and send their response to the mail or drop in the food pantry's designated location. Combined to the social distance and ban to access the crowded area, this

option was more likely preferred by the participants to complete the survey. It may bring the hawthorn effect when the participants to complete the survey, especially for post-survey.

Strengths

Despite having several limitations, the current study still did present more generalizable data in that a sample population for this project were from three separate food pantries and represents the general food insecure population. The use of AFSSM is a reliable tool for assessing and predicting FI severity. This food severity tool is supported by years of validated research and evidence. By providing an individual education session, the researcher had the opportunity to provide education tailored to the food pantry user's learning style. Different from the expected time constraints in the group session, the individual session provided the time participant could ask ample questions after the education session. Lastly, this study provides strong evidence for leveraging a food pantry setting for the implementation of health promotion interventions outside of the traditional health setting.

Implications for Future Research

This study provided an opportunity to implement a healthy nutrition and community resource education session among food insecure populations using the food pantry approach. It is plausible that multi-factorial interventions, such as the combined education of health and community resources, maybe more effective than health education alone among food insecure populations, as FI health behavior is shown to be influenced by a myriad of social determinant factors. The use of food pantries typically used for food provision as the setting of disseminating health promotion education allows to leverage the system and provide a unique opportunity for health promotion for these vulnerable population.

Ongoing efforts are needed to respond to FI and the many negative impacts; it plays on the overall health of vulnerable individuals. When coupled with diseases such as diabetes, hypertension, and or cholesterol, the effect of food insecurity can be detrimental. Food insecurity undermines the ability to comply with the necessary changes in the dietary management of many chronic diseases, which signifies the importance of interventions to counteract the damaging effects of FI such as community resources program and education to promote the overall health of a vulnerable population.

Our study didn't measure the longitudinal effects of education, whether the healthy diet education improves the health outcomes and whether the community resource awareness education leads to the real utilization of those community resources. Future research may consider to measure health outcomes as the effects of the combined education program with health diet and lifestyle education and community resources education for populations burdened by FI. Besides, although this study's sample size was small, the improvements in knowledge and confidence regarding healthier eating observed in this study suggest similar improvements could yield more considerable benefits at the population level. Further studies are recommended with a larger sample with state-wide project to see the population-level benefit of health promotion and disease prevention.

Implications for Practice

Health care professionals are largely involved with health promotion and screening strategies to improve the health of their patients; however, screening for FI is a vital aspect of health promotion. By screening for FI, nurse practitioners and other health care providers may be able to identify an underlying social determinant that is contributing to a patient's capacity for chronic disease management. Also, identifying FI Individuals in the clinical setting provides an

opportunity to connect these individuals with much-needed resources and support to improve chronic disease management and health outcomes.

Additionally, by moving health promotion and prevention strategies from the traditional clinical setting to community settings such as food pantries, nurse practitioners and other health professionals can reach into highly vulnerable populations. It is essential to leverage the strengths of both the traditional clinical approach and alternative community settings approach to access these vulnerable population and improve their health behaviors and outcomes by instilling knowledge and confidence to prepare healthy foods within their budget and modify their lifestyle healthier and by equipping them with the tools needed to enhance and manage their health. Besides, providing more awareness of local resources does offset the burdens of FI, allowing them to allocate more budget to disease management and health promotion.

Conclusion

While not routinely assessed in the primary care setting, FI is associated with many chronic diseases and poor health outcomes. Especially, DM, HTN, and HC are prevalent in the FI population and all of which require strict dietary regimens for managing and preventing disease exacerbation. In an ever-changing healthcare system, it is crucial to seek out innovative solutions to improve the reach to vulnerable populations and avert the negative influence of the FI on health. Implementing health education utilizing a food pantry approach, along with the incorporation of community resources, will provide opportunities in reducing health disparities and improving the health behaviors and outcomes in food-insecure populations.

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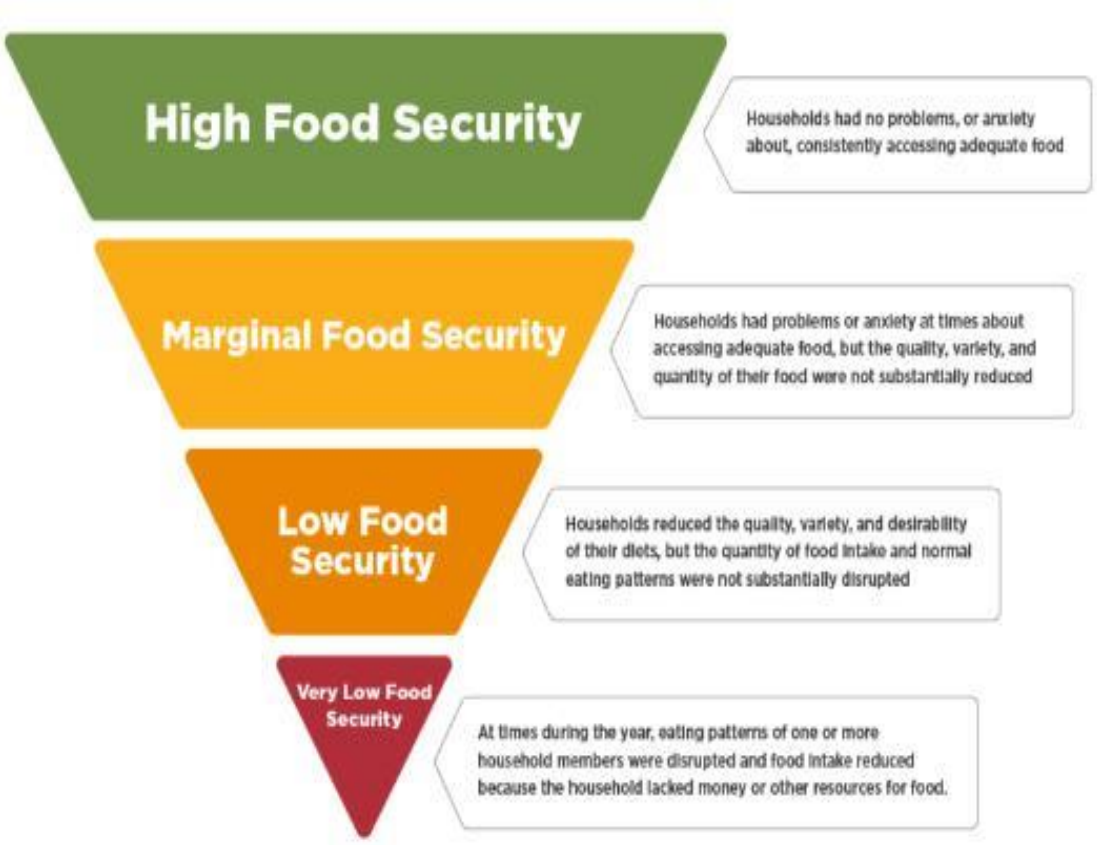
Appendices

Appendix A. Food Security Classification Levels

Food Security Classification Levels



Note. Adapted from United States Department of Agriculture, Department of Economic Research. (2019). Documentation overview of surveys. Retrieved from https://www.ers.usda.gov/data-products/food-security-in-the-united-states/documentation/#nhanes

Appendix B. Literature Review Summary Table

Reference	Evidence level	Study Design	Sample Characteristics/ Setting	Intervention	Major Variables	Statistical Analysis	Findings and worth to practice
Berkowitz, 2013	Level III	CSA	▪ Adults 20yr+, DM, DM meds ▪ Client home, mobile exam center	Determine FI association w/worse glycemic, cholesterol, BP control in adults with DM • Physical exams ▪ Non-fasting BS ▪ Cholesterol ▪ BP	▪ Level of FI ▪ A1C ▪ Cholesterol ▪ BP ▪ Demographic ▪ BMI ▪ Smoking status ▪ DM duration ▪ PCP use ▪ DM/HTN/Statin Med Use	• Higher proportion poor glycemic (27.0 vs. 13.3%, p= 0.001), poor LDL control (68.8 vs. 49.8%, p = 0.002) • No association between proportion of participants with SBP >140 mmHg or DBP>90 mmHg before (31.8% FI vs. 32.9% FS, p=0.75)	• FI associated with poor glycemic and cholesterol control even after adjusting for numerous demographic socioeconomic, and clinical factors. • No evidence of an association between food security and blood pressure control • FI: younger age, less education/income, race/ethnicity other than non-Hispanic white, no public insurance other than Medicare
Bomberg, 2019	Level III	NSA	• Adults 18yrs + • Food pantry users • Households with and without DM • Cognitive/mental disability exclusion • Food Pantry Setting	Understand food preferences and coping strategy utilization (e.g., choosing between paying for food and medical care) among households seeking assistance from food pantries with and without DM members Survey • coping strategies (cheap food, family/friend help, pawning, garden, buy damage or expired food). • Spending tradeoffs (food or med/utilities/rent/ medical care/transport/ education. • Demographics (age, sex, race, education, household size, income, insurance)	• FI • DM • Desired Food • Coping Strategies • Spending tradeoffs	• No statistically significant difference in the prevalence of poverty between households with and without DM (71.8% vs. 72.1%; p = 0.75). • Coping strategies DM households: 6.8, non-DM households 6.4 (p < 0.001). • choosing cheapest food p=0.20 • Spending tradeoffs food and medical care, p<0.01	▪ Households seeking assistance from food pantries have a strong desire for healthy food and must utilize multiple coping strategies in order to access sufficient food.
Caspi, 2017	Level IV	PPP, no control	• 18yrs+ • English speaking/reading • Food pantry user in last 30 days • Food Pantry setting, telephone interview	Evaluate effectiveness of a pilot cooking and nutrition education intervention among food shelf clients. • pre and post comparisons to evaluate a six-week cooking and nutrition education class. pre-intervention assessments (T1), post-intervention assessments (T2), and, for the purposes of assessing feasibility, follow up assessments after 30 days (T3).	• Dietary intake (Healthy Eating Index) • Cooking skill • Demographic (age, sex, race education, employment) • Sociodemographic (WIC, SNAP benefits)	• T1, T2 Mean HEI scores 50.9 at baseline, increased to 58.5 at T2 (p = 0.01). • T1, T2 Cooking mean scores 33.1 at baseline, increased to 35.9 at T2 (p = 0.002). • HEI scores and cooking skills scores from baseline to T3 - HEI mean scores had returned to baseline levels at T3 with only an 0.18-point increase in scores from T1 (p = 0.95)	▪ Diet quality improved by end of intervention. Cooking skills improved by the end of intervention. ▪ Among participants who were followed for one month after the intervention, HEI scores were not sustained, but elevated cooking scores were.

						• Sustained mean increase of 2.97 points in cooking skills scores from baseline to T3 (p = 0.003)	
Dave, 2017	Level VI	FMM	• 21-50 yrs, 1+child, main food preparer • Pantry staff • Food pantry setting	Addressing at-risk, low-income, FI population health needs by working to understand their access to food, how they perceive food/nutrition, how/ what format the information would best serve this population. • Pantry Staff: group meetings to develop nutrition education intervention for food bank • Pantry clients: Focus group interview • Cognitive interview Nutrition education (6 sessions/6months) based on program developed: pamphlet distribution, classes	• FI level • Pantry use • Demographic (income, sex, race, education, BMI. marital status) • Client/Staff opinions	• Mean BMI 31.6 kg/m2 • Mean age 38 years. • All the clients FI: 60% reported VLFS • 60% visited the food pantry once a • month, with the remaining visiting twice a month. • Most common foods obtained from the pantry: rice, bread, canned beans, cereal, and peanut butter.	While working with a low-income audience, consideration of low literacy levels is important. Program should be designed at a grade level of 3 to 5. Because a healthful diet is one of the major components of a healthful lifestyle, increasing nutrition knowledge and skills in menu planning, grocery shopping, and food preparation is crucial. Comprehensive nutrition education programs must target skills and knowledge for making the right food choices and also matches the client living circumstances. Nutrition education provided at food pantries represents a unique opportunity to address the epidemic of obesity, while also supporting vulnerable citizens with a strong nutrition safety net
Driver, 2016	Level IV	PPP	▪ 18+yrs • Soup kitchen, head start	• cooking demonstration, taste-testing of a prepared meal, nutrition education	• Demographics • Cooking efficacy • Nutrition knowledge • Food Safety	• Improved diet knowledge, (t=3.21; p=0.04) • Improved knowledge of the MyPlate food guide (t=2.82, p=0.010). • Improvements in basic food safety knowledge (p<0.001) • No significant gains in cooking confidence	• Knowledge is a building block toward behavior change-, increased nutrition knowledge may lead to improvements in confidence to prepare healthy, balanced meals
Grilo, 2015	Level II	RCT	• 18ys+, T2DM, Uncontrolled HTN, 6-month practice affiliation, English/Spanish speaking • Ambulatory care clinic setting	Evaluate the impact of food insecurity on blood pressure reduction. • Provided BP monitoring device with training. Pt recorded 3 days/week x 6months. • Home BP telemonitoring (HBPTM), educational materials (DM, HTN), 30 mon telephone session w/ nurse care manager (NCM). • HBPTM+NCM self-manage support (weekly calls x 1mo, biweekly x 3mo, monthly x months 4-6), counseling,	• FI level • Demographics(age, sex, race, income, education, BMI) • HTN meds • Med compliance • Insurance coverage • SBP/DBP	• Hispanic more likely than AA food insecure (p = .04) • No significant differences between FS and FI in the number of home BP readings transmitted (17.8 vs 18.8, p= .80) or in the # of telephone sessions among HBPTM+NCM group (8.2 vs 9.3, p = .68) • Interventions significantly decreased SBP among food-	▪ Nonsignificant reduction in SBP of 2.7 mm Hg from baseline to 6 months across both intervention arms (main effect of Time). The Group × Time interaction was not significant, indicating no difference in the efficacy of the 2 interventions food-secure experienced clinically and statistically significant

				education (HTN/DM) med/appt reminders, patient to provider communication, individualized goals, target behaviors.		secure participants (b = −0.77, t = −4.35, p < .001) but had no significant impact on SBP among food-insecure participants (b = 0.25, t = 1.52, p = .14).	reductions in BP, no significant change among food-insecure ▪ Poorer health outcomes in FI versus FS ▪ HTN self-management interventions based on traditional behavioral recommendations are unlikely to improve BP in FI population. ▪ No significant differences in self-reported medication adherence or health insurance coverage between FS vs FI
Heerman, 2015	Level II	CSA of Cluster RCT	• 18yrs+, T2DM, English/Spanish speaking, A1c ≥ 7.5, 2yr commitment agreement • Exclusion: poor visual acuity, dementia, psychosis, terminal illness, life expectancy<2 yrs. • Primacy care clinic setting	Examine the association between FI, DM self-care and glycemic control • Provider training • Surveys and abstraction of medical records from the local clinic • Assessment (FI, Medication adherence, A1C)	• FI level • Demographics (age, sex, race, income, insurance, education, BMI, duration of DM • DM self-care behavior • Medication adherence • A1C	• FI in the past year- lower median age at enrolment (51 vs. 55 years, p= 0.02), lower income (< $10 000; 57% vs. 46%, p= 0.048) • FI associated with age (p = 0.047), BMI (p = 0.003) and higher HbA1c (p = 0.01), but not with duration of DM or education level (all p> 0.05) • FI associated with diet (p = 0.02), activity, behaviors (p = 0.04), calorie restriction strategies (p = 0.02), non-adherence to Meds (p = 0.002). • Median HbA1c 9.3% FI vs. 8.6% FS (p=0.02) • HbA1c correlated with continuous measure of FI (p = 0.01), this relationship remained significant after adjustment for age, gender, race/ethnicity, income, education, BMI and DM duration (p=0.03)	• FI corelated with less adherence to DM self-care behaviors, eating poorly and skipping meals more often, less physically active, less medication adherence, worse glycemic control • The associations between FI and glycemic control, and FI and DM self-care behaviors point to FI as a modifiable risk factor for improving DM control, especially in low income populations
Ippolito, 2015	Level III	CSDS	• >18yrs+, English/Spanish fluency, A1C≥-6.5% or self-report DM, DM med/insulin. • Exclusion: pregnancy, hearing/cognitive impaired	Examine the association between level of FS and DM self-management among food pantry clients • point-of-care A1C testing to determine glycemic control and capture DM self-management.	• FI level • DM self-manage (A1C, DM distress, med adherence, severe hypoglycemia, depressive symptoms, food /med tradeoffs • Demographic(age, sex, race, education, tobacco use, site)	• No statistically significant difference in mean HbA1c or percentage of participants with HbA1c level above 8.5% by level of food security. • Mean BMI greatest among the VLFS group and differed significantly from that of the food-secure group (35·0 v. 32·7kg/m2, p=0·009)	LFS, VLFS- significantly higher odds of depressive symptoms, experiencing challenges around affordability of meds and DM supplies, making trade-offs between food and meds and medical supplies. VLFS did not have significantly higher HbA1c values than those LFS or FS.

			• Food pantry setting			• Tobacco use was more than twice as frequent in the VLFS compared with the food-secure group (31% v. 12%, p<0·001) • poorer DM self-management in the FI groups • DM self-efficacy scores were on average 0.51 units lower (95% CI −0·85, −0.17) and the mean diabetes distress score was 0.79 points higher (95% CI 0·54, 1.04) among VLFS compared with food-secure • Compared with food-secure participants VLFS had average med non-adherence scores 0.31 units higher (95% CI 0·12, 0·50). • Adjusted odds of an episode of severe hypoglycemia among VLFS 2.6 times greater than food secure (OR=2·63; 95% CI 1·42, 4·85).	DM distress highest in VLFS. Independent associations between FI and barriers to DM self-management. DM self-management support programs for this population must address not only DM self-care and food affordability, but also low self-efficacy, emotional distress and mental health, and barriers to medication adherence • Non-clinical settings may effectively reach the most food-insecure adults with DM
Knight, 2016	Level III	CSA	• Adults, self-report DM, DM med/insulin • National Health Interview Sample of Households setting	• Examined the prevalence of FI among adults with self-reported diabetes and whether FI associated with cutting back ("scrimping") on medications because of financial constraints. • Survey analysis	• Med adherence • FI level • Demographic (age, sex, race/ethnicity, BMI, education, employment, residence region, insurance)	• FI associated with med scrimping (p<0.0001), • FI DM: 6-fold higher odds of scrimping (p<0.0001) • MFS: 2.5 higher odds of scrimping (OR 2.66, 95% CI 1.78, 3.98) • Uninsured adults at increased risk for medication scrimping (adj OR 3.06, 95% CI 2.03, 4.62). • Females more likely to report FI, AA/Hispanic more likely to report FI than white (28.7%, 26.5% and 12.1%), 18-44yrs more apt to report FI • 1 in 5 DM report med scrimping (18.9%), delayed refills(16.4%), inability to afford (15%), taking less (13.8%),skipping doses (13.1%).	• FI and level associated with med scrimping. • FI/DM higher odds of med scrimping. • Most common form of med restriction was delaying filling prescriptions to save money (16.4%), followed by inability to afford meds at all (15.0%), taking less meds (13.8%) or skipping doses (13.1%). • Prevalence of all scrimping behaviors was higher among FI and MFS adults compared to FS adults. • Over one-third of FI/ DM reported skipping doses (35.2%), taking less medication (36.5%) or delaying filling medications to save money (43.7%).
Schroeder, 2018	Level IV	LCS	• 65yrs+, FS, DM, FI, Kaiser Permanente Colorado members	Examine the relationship between food insecurity and ED visits, hospitalizations, A1c, and diabetes medication adherence over one year of follow-up among individuals 65 years with diabetes mellitus	• Demographics (age, sex, race, BMI, marital status, insurance, education) • Health, medication • Geriatric syndromes	▪ FI more likely to have an ED visit (23.9% vs. ▪ 18.2%, p b 0.001) or hospitalization (16.0% vs. 11.9%, p = 0.005) than those without FI	• FI Individuals were more likely to be female, member of a racial or ethnic minority, current smokers, and had more comorbidities.

			• online, telephone, paper settings	• FI screening • DM/HTN screening • Glycemic control monitoring • DM food provision • Healthcare referral • DM self-management support DM education	• Tobacco/Alcohol use • Falls, problems with balance • Oral issues • Urinary incontinence • Problems with memory, attention, thinking • Health conditions that interfere ADL • Hospitalization/ED visits • A1c • Medication adherence	• A1C higher in FI (7.5% vs 7.2%, p<0.001) • After addition of baseline utilization, A1c, and adherence, the relationship was no longer statistically significant.	• In the one-year follow-up period, individuals with diabetes and food insecurity were more likely to visit the ED or be hospitalized and have a higher A1c compared to FS..
Seligman, 2015	Level III	PS	• food panty user, HbA1c ≥6.5 percent or a self-report DM+ DM med • Food bank setting	Explored the feasibility of using food banks to provide DM support • FI screening • DM self-management education • DM food box provision • DM screening • BS monitor • A1C • DM appropriate food provision • Healthcare referral • DM self-management support	• Baseline, 6 mo A1C • DM self-management outcomes. • FI status/level • Demographics (age, sex, ethnicity, language, education, BMI) • Tobacco use • F/ V intake • Self-efficacy • DM distress • Med adherence • Food satisfaction	• significant improvement in mean HbA1c from • baseline (8.11 percent) to follow-up (7.96 percent), p<0.01. • poor glycemic control (HbA1c >9 percent) declined from 28 percent to 25 percent, p<0.01. • Improvements in fruit and vegetable intake (p<0.05), self-efficacy (p<0.001), DM distress (p<0.001), medication nonadherence (p<0.10), and trade-offs between buying food or medicine, p<0.001	• Provision of DM appropriate food in association with on-site monitoring of HbA1c, self-management support, and referral to primary care providers might result in improved glycemic control and self-management skills and competencies among adults with DM.
Seligman, 2018	Level II	RCT	• 18yrs+, A1C 7.5%+, Pantry user, English/Spanish fluency, Phone or mailing address, Remain in area 12 months • Exclusion: pregnancy, <6-week postpartum, cognitive impaired, T1DM. • Food pantry setting	Determine whether food bank provision of self-management support and DM appropriate food improves glycemic control among clients with DM. • BS /A1C testing at 3 and 6 months • PCP referral • DM self-management class • DM education, 1 on 1 check in with educators • Biweekly DM food box provision • Control: regular pantry service x 6 months. After 6 months, received modified intervention	• A1C • FI level • Food stability • Hypoglycemia episodes • Tradeoffs • Cost related med nonadherence • DM distress • Depression • DM self-efficacy • DM self-care • Med adherence • Intervention satisfaction	• Significant improvements in intervention compared with the control group in outcomes related to food, including food security (p = .03), food stability (p= .01), and fruit and vegetable intake (p = .04). • No significant difference in added sugar intake. • No nonfood outcomes differed between the intervention and control groups except for tradeoffs between food and DM supplies (p= .03). • HbA1c at follow-up was not significantly • different between the 2 groups (intervention • 9.12% vs control 8.88%; p= .16).	• Comprehensive DM self-management support and DM-appropriate foods for food pantry clients with poorly controlled DM had significant improvements in outcomes related to food—the core operational expertise of food banks and food pantries. • No improvements in outcomes related to DM self-management or glycemic control
Shin, 2015	Level III	CSA	• 21-74yrs+, FI+, Dyslipidemia+	Assess whether FI associated with dyslipidemia. • Questionnaire	• Serum lipid levels	• Recent history of FI associated with higher prevalence of obesity among	• FI was not associated with high TC among men or women.

			• Survey: In home interview/questionnaire, mobile clinic/fixed clinic		• Demographics (Height, Weight, BMI, Income, Education, insurance, Occupation) • Smoking status • ETOH intake • Physical activity • Health status report	women (OR: 2.09; p=0.003; but not among men (OR: 1.09; p=0.73). • gender and FI: obesity was statistically significant (p=0.04) • Recent history of FI was not associated with high TC in men (OR: 1.01; p=0.96) or women (OR: 0.62; p=0.11) • Recent history of FI associated with a higher likelihood of low HDL-C among women (OR: 2.31; p=0.001), but not among men (OR: 1.14; p=0.58)	• FI associated with a higher likelihood of low HDL-C among women but not among men. • Obesity appears to be a partial mediator of the association among women. • Gender differences are important to note in understanding high risk populations and designing effective education and training
Silverman, 2015	Level II	RCT	• 30-70 yrs, poorly controlled type 2DM (A1c ≥ 8.0 %), household income < 250 % of the federal poverty level • Large public hospital, VA medical center, community-health center Settings	Determine the relationship between FS status and depression, DM distress, medication adherence and glycemic control • Survey analysis	• Demographics (Sex, Age, race, language, education, marital status, BMI, income) • Medical conditions • insulin use • depression • DM distress • low med adherence • FS status	• FI clients more likely to be depressed (40.7 % vs. 15.4 %, p<0.001), report DM distress (55.2 % vs. 33.8 %, p<0.001), low med adherence (52.9 % vs. 37.2 %, p=0.02). • FI clients-significantly higher mean A1c (β=0.51; p=0.02)	• FI associated with depression, DM distress, low medication adherence and worse glycemic control.
Simmet, 2017	Level II	SR	• Studies reporting food provision, English data, food banks/pantries, 18yrs+, socioeconomic disadvantaged, Food bank use+ • Charitable food entity setting •	Summarize published evidence about the dietary quality of food pantry users. • Diet recall • Food questionnaires Dietary intake	• Nutritional intake • Diet quality/intake • Energy intake • Food groups • Macronutrients • Micronutrients • Demographics (age, BMI, income, marital status, employment, ethnicity, sex) • Welfare benefits • Home • Children in home •	• HEI scores <50 indicated non-health promoting diet with 4 pantries having mean score of 42.8, only 29% scored>50 • Mean energy intake was less than recommended. • 25% consumed no fruit or veggies • 10% to 40% had an inadequate intake of meat and alternatives •	• All studies found mean intake of F/V and dairy products to be below recommendations. • Dietary quality of studied food pantry users is inadequate, particularly for F/V, milk products and calcium
Venci, 2018	Level III	CSA	• 18yr+, sample of household representatives of the civilian noninstitutionali	Examined associations of functional limitation due to any health problems and six chronic diseases (arthritis, DM, coronary heart disease, heart attack, HTN, and stroke) with FS among U.S. adults.	• Functional limitation • chronic disease • FS level • Socio-demographics (age, sex, race, marital status, education,	• VLFS highest among younger adults 18-24 years, females, non-Hispanic blacks, unmarried, less than high-school education, income of less than $34,999, obese	• FS significantly associated with functional limitation and chronic diseases • FI adults more likely to show physical inactivity, lower fruit

			zed U.S. population • Face to face interview setting	• Survey data analysis	income, BMI, tobacco/alcohol use) • child in household	adults, unable to work, 3 or more children in the household, smokers. • Overall, 35.7% of the adults had functional limitation due to any health problems and the prevalence was followed by HTN (29.3%) and arthritis (23.1%). • VLFS was higher among adults with functional limitation and those with arthritis, borderline DM, CHD ,MI, HTN, and stroke than adults without (c2 tests, p < .05 for all variables)	and vegetable consumption, current smokers. • Odds of having coronary heart disease were 16% greater in LFS and 75% greater in VLFS when compared with those who were FS while controlling for other factors. •

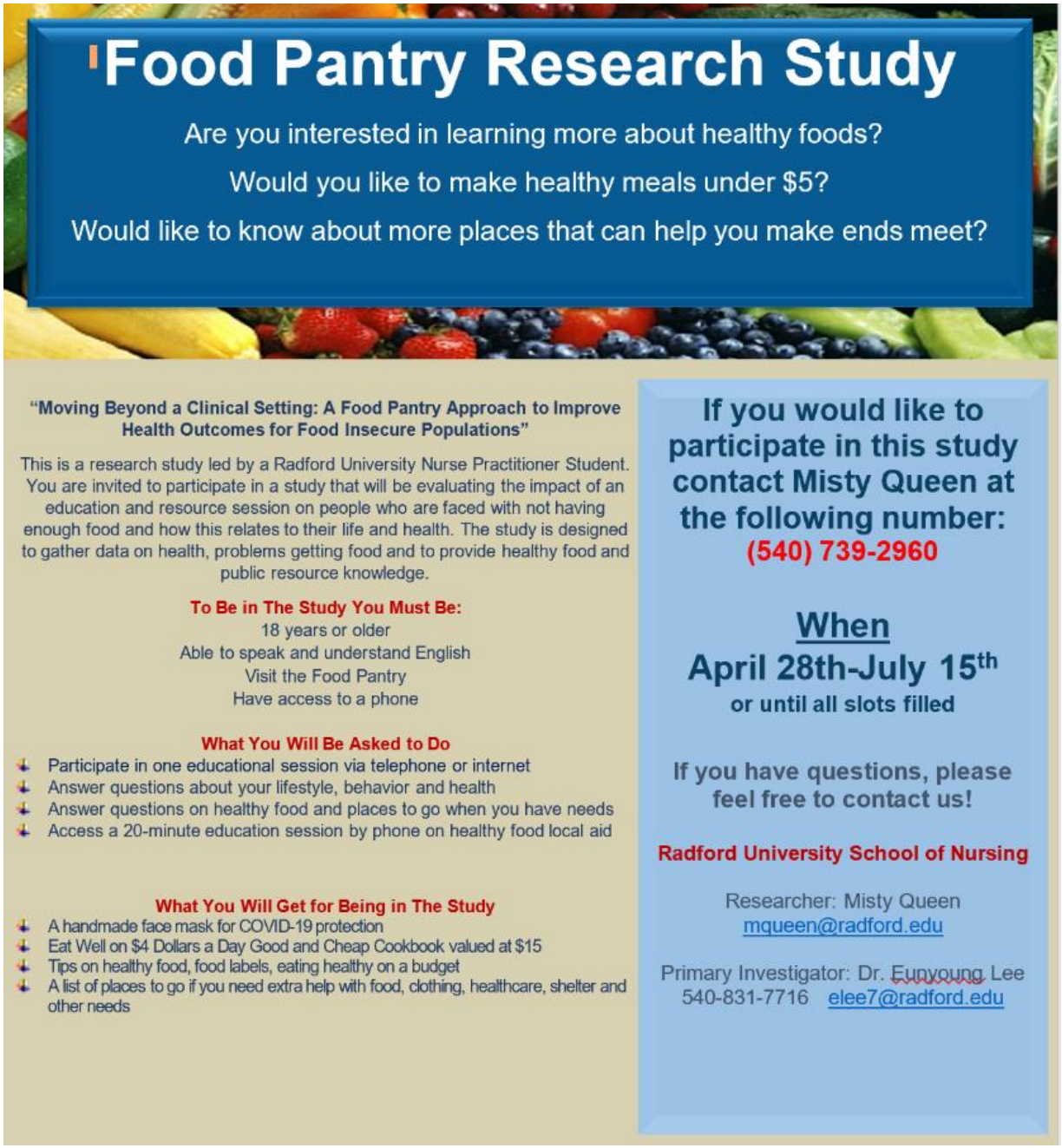
Appendix C. Interventions to Improve FI Health Outcomes

Literature Review Intervention Summaries

	Author, Year	Subjects, Settings	Study Design	Intervention 1: Food Provision	Intervention 2: Diet Education session	Intervention 3: Cooking Sessions	Intervention 4: Disease Education	Intervention 5:BP monitoring	Interviewing - No intervention	**Survey Analysis- No intervention**	Outcomes 1: Hgb A1C	Outcomes 2: BP, biometric data	Outcomes 3: Cholesterol	Outcomes 4: Healthy Food	Outcomes 5: Medication Adhere	Outcome 6: Food Preference	Outcome7: Self-Care Management	Outcome 8: Coping strategies	Outcome 9: Food security Level	Outcome 10: Change or Intent	Outcome 11: Diet Knowledge	Outcome 12: Cooking Efficacy	Outcome 13: Participant Views	Outcome 14: Presence of Disease	Outcome 15: Functional Limits	Outcome 16: Dietary Quality
1	Berkowitz 2013	20yrs+, DM	CSA	X	X					X	↑	↑		↑			↑		+		↓					
2	Bomberg 2016	18yr+, food pantry user, DM National hunger survey	CSA							X					+			+	+					+		+
3	Caspi 2016	18yr+, English speaking, pantry user. Food pantry	PPP		X	X														↑	↑	↑				↑
4	Dave 2019	21-50 yrs +. 1 child pantry clients, Staff. Food pantry	CD		X				X			+			+			+	+		+		+			
5	Driver 2016	18+yrs+,Soup kitchen, head start	PPP		X	X								↑							↓	↓				↑
6	Grilo 2015	18yr+, DM, HTN, English or Spanish. Ambulatory clinic	P		X		X	X				↓														
7	Heerman 2015	18-85yrs, English or Spanish, A1c 7.5%+. Primary care clinic, health department	CSA, RCT							X	+	+	+		+		+		+					+		
8	Ippolito 2017	18yrs+ DM	CSA						X	X	+	+			+		+	+	+							
9	Knight 2017	DM adults. National health survey	CSA							X		+			+				+							
10	Schroeder 2019	65yrs+, DM. Online, phone, clinic	LCS							X					+									+	+	
11	Seligman 2015	Food pantry user, Food pantry	P	X	X		X				↑				↑	↑	↑		↑				+	+		↑
12	Seligman 2018	18yrs+, English/Spanish. Food pantry	P	X	X		X				↓						↓		↑	↑			+			↑
13	Shin 2017	21-74yrs. National health survey	CSA							X		+	+						+							
14	Simmet 2017	18 yrs +, FI. High income country survey	CSA							X		+							+							+
15	Silverman 2015	T2DM. Hospital, medical/ health center	RCTA							X		+				+	+		+							+
16	Venci 2018	18+ yrs. National household survey	CSA							X		+			+			+	+							+

Abbreviations: Cross-sectional Analysis (CSA), Pilot (P), Pre/Post Intervention (PP), Randomized Control (RCT), Systematic Review (SR), Qualitative (Q), Analysis (A), Diabetes (DM) Hypertension (HTN). (X) Study intervention. (+) Outcome significance observed. Arrow up significant outcomes. Arrow down no significance.

Appendix D. Recruitment Flyer



Appendix E. Informed Consent

RADFORD UNIVERSITY

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Informed Consent

Title of Research Study: You are being asked to participate the research study *Moving Beyond a Clinical Setting to Reduce Health Disparities: A Food Pantry Approach to Improve Health and Wellness Among Food Insecure Populations*.

Sponsor of Study: The study will be conducted by Misty Queen, a nurse practitioner student researcher in Radford University's School of Nursing Doctor of Nursing Practice program and the Primary investigator Dr. Eunyoung Lee.

Purpose of the study: This study will be examining the challenges people have when they are faced with a lack of consistent access to enough food for an active, healthy life. This is known as food insecurity. The study aims to investigate food insecurity severity and how this severity correlates with demographic data and health. The study will also provide nutritional education and community resource awareness with the aim of improving health outcomes for food pantry users. The information collected will help to provide an understanding of the lifestyles, health, nutritional knowledge, access and awareness to food and community resources in people who are impacted by food insecurity.

Procedures: If you agree to participate, we will ask you to complete a questionnaire about your age, gender, race, education, income, employment, health, housing, transportation and food status. In addition, you will be asked to complete a pre and post survey that will ask questions about knowledge and awareness of nutrition and community resources. Total time required for participation is 40-50 minutes. The study procedures include:

1. Complete the baseline questionnaire.
2. Complete the pre-survey on healthy food and local aid programs.
3. Attend a 20 minute education session on healthy nutrition and community resources via phone or online session.
4. Complete the post-survey on nutrition and community resource knowledge.

Number of Participants: Approximately 64 individuals will be asked to participate.

Risks: We anticipate that your participation in this study presents no greater risk than every-day life.

Benefits: The benefits of your participation will include a handmade face mask for COVID-19 protection, the *Eat Well on $4 Dollars a Day Good and Cheap Cookbook* ($15 value), opportunities to gain knowledge of nutrition and awareness of community resources.

Voluntary Participation: Taking part in the study is voluntary. If you choose to participate, you can skip any question you do not want to answer or that makes you feel uncomfortable. Deciding to take part in the study or not, or withdrawing from the study, will not affect any current or future relationship with It's All About Jesus Outreach and Help Center, Spiritual Roots Food Bank, The Giving Tree Food Pantry or Radford University. Each household member may decide to participate. Your household may participate even if all members do not agree to participate.

Compensation: Everyone who participates in the study will be given a handmade face mask for COVID-19 protection and a copy of the *Eat Well on $4 Dollars a Day Good and Cheap Cookbook*, which is valued at $16.

Statement of confidentiality: We are required by law to use your information for statistical research only and to keep it confidential. We will be collecting your email or phone number only. We will not be collecting any other identifiable data. We will only collect your name and signature on the informed consent. Upon signing this consent, you will be assigned an identification number. To protect your confidentiality, you will be referred to by your assigned identification number and remain anonymous for the remainder of the study. Any identifiable information will be stored in a restricted access folder, an encrypted cloud-based system, locked office cabinet away from all other study data. All other surveys will be labeled with identification number only. The researchers' data files will be password protected and located on a password protected personal laptop. All of the data files related to the study will be retained for three years following the completion of the study in a locked file cabinet. After three years the files will be deleted.

Where to go with questions about the study: If you have questions now about this study, please ask them now before signing this consent to participate in the study. If you have any questions later, or if this study raised some issues that you would like to discuss with a professional, you may contact Misty Queen at mqueen@radford.edu or Dr. Euna Lee at elee7@radford.edu or 540-831-7711. This study was approved by the Radford University Committee for the Review of Human Subjects Research. If you have questions or concerns about your rights as a research subject or have complaints about this study, you should contact Dr. Ben Caldwell, Institutional Official and Dean of the College of Graduate Studies and Research and Research Compliance, Radford University, bcaldwell13@radford.edu 1-540-831-5724.

I read and understand the information provided on this form. By printing my name and signing below, I show that I am at least 18 years of age and having the ability to consent, I agree to take part in this study.

_____	_____	_____
Signature	Printed Name(s)	Date

I/We have explained the study to the person signing above, have allowed an opportunity for questions, and have answered all of his/her questions. I/We believe that the subject understands this information.
Misty Queen & Dr. Euna Lee 5/1/2020 ****This copy is provided for your records****

Appendix F. Baseline Survey

Baseline Survey

Please answer each question by marking an X by your answer

1. What is your age? Select one

- Under 18 years
- 18 to 24 years
- 25 to 34 years
- 35 to 44 years
- 45 to 54 years
- 55 to 64 years
- Age 65 or older

2. Gender Identity-How do you describe yourself? Select One

- Female
- Male
- Transgender
- Do not identify as female, male, or transgender

3. What is your race? Select One

- Caucasian/White
- African American
- Asian
- Hispanic
- Other

4. What is the highest level of school you completed? Select One

- Eighth grade or less
- 9^{th}-11^{th} grade
- Grade 12 or GED
- Some college or technical school
- College or technical school graduate

5. Which of the following describes your employment status? Select One

- Full time (35 hours a week or more)
- Part time (Less than 35 hours a week)
- Retired
- Disabled
- Laid off
- I am not currently employed

6. Which of the following describes your housing status? Select One

- Homeless
- Apartment
- Mobile home
- House
- Other

7. How many people are currently living in your household, including yourself? Select One

- 1-2
- 3-4
- 5 or more

8. Which of these categories best describes your total combined family income for the past 12 months? Select One

- $5,000 or less
- $5,001-$10,000
- $10,001–20,000
- $20,001– 30,000
- $31,000-40,000
- Greater than $40,000

9. What type of health insurance coverage do you currently have? Select All that apply

- I do not have health insurance
- Medicaid
- Medicare
- Veteran benefits
- Other type of health insurance

10. Has a doctor, nurse, or other health professional ever told you that you had any of the following? Select all that apply

- Diabetes
- Hypertension
- High cholesterol
- I do not have any of these conditions

11. Have you been prescribed medication for any of the following conditions? Select all that apply

- Diabetes
- Hypertension
- High cholesterol
- I am not taking medications for these conditions

12. Has there a time in the past 3 months when you did not take your medication as prescribed because of cost? Select one

- Yes
- No
- No medication was prescribed
- Don't know/ not sure

13. How many times in the past 3 months have you been faced with a choice between buying food or paying for medication? Select One

- None
- 1
- 2
- 3 or more

14. Have you been seen by a health care provider for chronic disease management or preventive services such as vaccination in the past 3 months? Select One

- Yes
- No

15. Have you been hospitalized or visited an emergency room due to sickness in the past 6 months? Select One

- Yes
- No

16. What is your major transportation method? Select One

- Personal Vehicle
- Public Bus
- Walking
- UBER/LYFT
- Other

17. Do you have a personal cell phone with internet capability? Select One

- Yes
- No

18. Do you have internet access at home? Select One

- Yes
- No

19. Have you used this food pantry prior to the COVID-19 outbreak?

- Yes
- No

The next questions will inquire about your nutrition. Place an X by your answer

1. Which of these statements best describes the food eaten in your household in the last 12 months. Select one

- Enough of the kinds of food we want to eat
- Enough but not always the kinds of food we want
- Sometimes not enough to eat
- Often not enough to eat
- Don't know or Refused

2. "I worried whether our food would run out before I got money to buy more." Was that often true, sometimes true, or never true for (you/your household) in the last 12 months? Select one

- Often true
- Sometimes true
- Never true
- Don't know or Refused

3."The food that I bought just didn't last, and I didn't have money to get more." Was that often, sometimes, or never true for (you/your household) in the last 12 months? Select one

- Often true
- Sometimes true
- Never true
- Don't know or Refused

4."I couldn't afford to eat balanced meals." Was that often, sometimes, or never true for (you/your household) in the last 12 months? Select one

- Often true
- Sometimes true
- Never true
- Don't know or Refused

5. In the last 12 months, did (you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food? Select one

- Yes- answer question 6 below
- No-skip question 6 and go to question 7
- Don't Know-skip question 6 and go to question 7

6. If you answered YES in the previous question, How often did this happen? Select one

- Almost every month
- Some months but not every month
- Only 1 or 2 months
- Don't Know

7. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food? Select one

- Yes
- No
- Don't Know

8. In the last 12 months, were you every hungry but didn't eat because there wasn't enough money for food? Select one

- Yes
- No
- Don't Know

9. In the last 12 months, did you lose weight because there wasn't enough money for food? Select one

- Yes
- No
- Don't Know

10. In the last 12 months, did (you or other adults in your household) ever not eat for a whole day because there wasn't enough money for food? Select One

- Yes- proceed to question 11
- No – end of survey
- Don't Know-end of survey

11. If you answered YES to the previous question, How often did this happen? Select One

- Almost every month
- Some months but not every month
- Only 1 or 2 months
- Don't Know

End of Survey

Appendix G. Pre/Post Survey

Education and Awareness PRE-Survey

The next questions will ask you about nutrition Place an X by your answers.

1. Which of the following are part of the five food groups: Select all that apply

	Dairy
	Fat
	Protein
	Fruit
	Vegetables
	Grains

2. How many cups of DAIRY products should you have daily? Select one

	Two(2)
	Four(4)
	One(1)
	Three(3)

3. How much of your plate should be FRUITS and VEGETABLES? Select one

	1/2 plate
	1/3 plate
	Full plate
	None

4. For better health, I know to choose foods that are LOWER in: Select all that apply

	fiber
	sodium
	saturated fat
	sugar

5. For better health, I know to choose foods that are HIGHER in: Select all that apply

	fiber
	sugar
	unsaturated fat
	vitamins
	Minerals

The next questions ask about your thoughts Place an X by your answer

6. Eating healthy is important to me. Select One

	Not Important
	Somewhat Important
	Neutral
	Important
	Very important

7. I feel confident I can prepare meals with the healthier options for under $4 dollars. Select one

	Not Confident
	Somewhat Confident
	Neutral
	Confident
	Very Confident

8. I can use a Nutrition Label to help me choose food higher in nutrients and lower in fat and sodium Select One

	Cannot
	Not very easily
	Somewhat easily
	Easily

This section wants to know if you are aware of the places you can go for help with food Place an X in a box that Best fits your awareness or use of the place listed.

Food Assistance	Not Aware of	Aware of	Used in Past 3 months	Plan to use in next 3 months
Supplemental Nutrition Assistance Program (SNAP)				
Women, Infants and Children Supplemental Nutrition Assistance Program (WIC)				
Radford City/Pulaski County				
It's All About Jesus Help & Outreach Center				
Beans and Rice				
Fairlawn Daily Bread				
Jordon's Chapel Food Pantry				
Little Creek Food Pantry				
His Provision Food Pantry				
Valley Harvest Ministries Food Pantry				
The Dream Center				
Dublin Baptist Church Food Pantry				
Heritage Cares Food Pantry				
Pulaski Daily Bread				
Radford Fairlawn Meals on Wheels				
Food Assistance	**Not Aware of**	**Aware of**	**Used in Past 3 months**	**Plan to use in next 3 months**
Montgomery County/Floyd County				
Spiritual Roots Community Food Pantry				
Montgomery County Emergency Assistance				
Salvation Army Soup Kitchen				
The Giving Tree Food Pantry				
Blacksburg Interfaith Food Pantry				
Harbor of Hope Food Pantry				
New River Valley Senior Services				
Shawsville Lay Ministerial Food Pantry				
Plenty				
Walton Food Pantry				

This section wants to know if you are aware of the places you can go for help with Housing, Clothing and Diapers Place an X in a box that Best fits your awareness or use of the place listed.

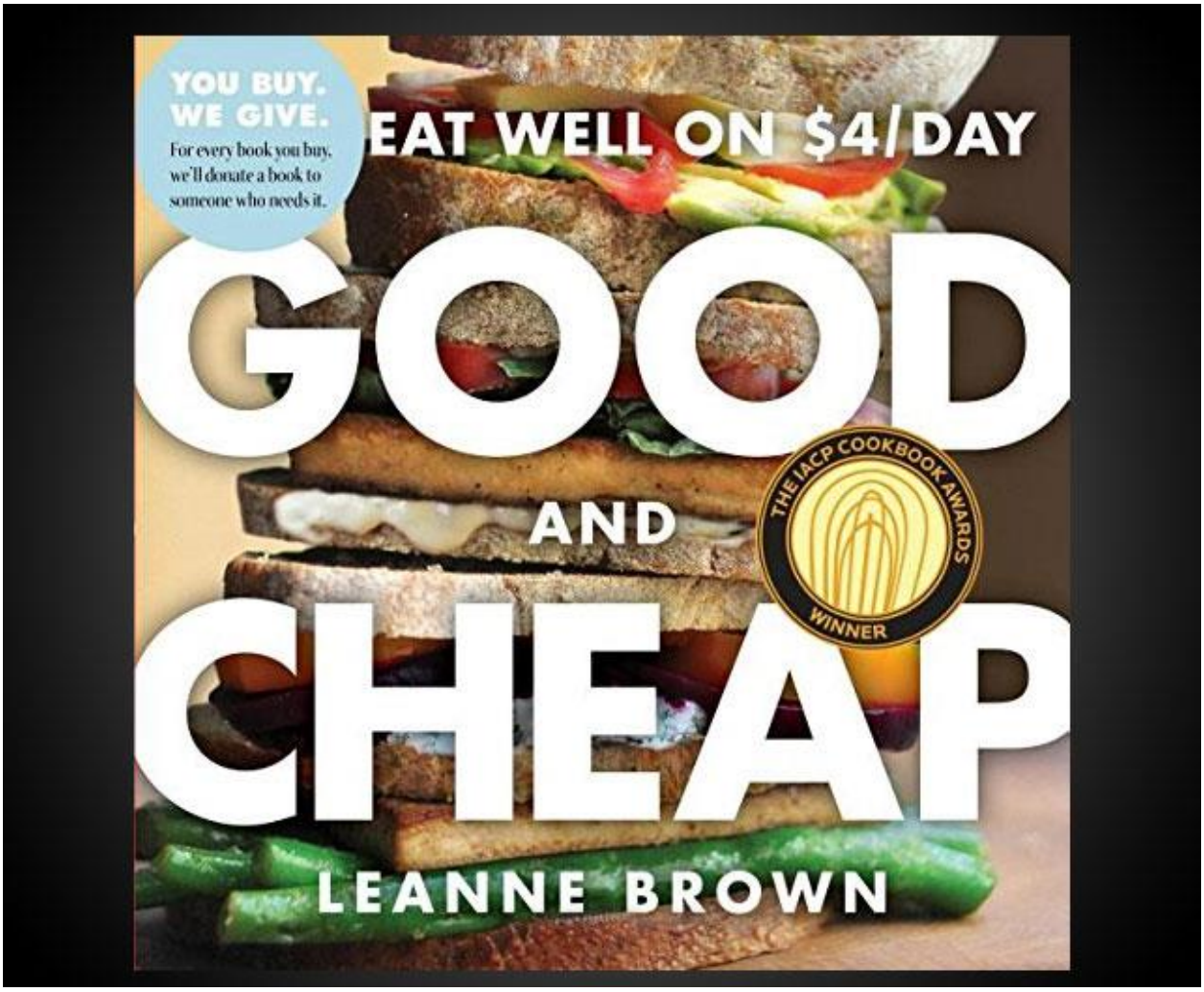
Housing Assistance	Not Aware of	Aware of	Used in last 3 months	Plan to use in next 3 months
To Our House				
New River Family Shelters				
Homeless and Housing Program				
Housing Counseling				
Community Housing Partners				
Clothing and Diaper Assistance				
Radford Clothing Bank				
Giles Christian Service Mission				
Salvation Army				
Solomon's Closet				
It's All About Jesus Help and Outreach Center				
New River Valley Diaper Pantry				
Pregnancy Resource Center				
City of Refuge				

This section wants to know if you are aware of the places you can go for help with Healthcare
Place an X in a box that Best fits your awareness or use of the place listed.

Low Cost Healthcare	Not Aware of	Aware of	Used in past 3 months	Plan to use in next 3 months
Pulaski Free Clinic				
Community Health Center of the NRV				
Tri-Area Community Health				
The Barter Clinic				
Valley Women's Clinic				
Every Woman's Life				
Montgomery County Health Department				
Pulaski County Health Department				
Pregnancy Resource Center				

Appendix H. Participant Incentives

Appendix I. Good and Cheap Cookbook



Appendix J. Education Handouts

Appendix K. Community Resource Directory

Food Assistance

MONTGOMERY COUNTY EMERGENCY ASSISTANCE PROGRAM

Part of the New River Community Action Program, the MCEAP Food bank and office are open on Monday- Thursday from 8:00-11:30 a.m. & 1:00-4:00 p.m., and on Friday from 8:30 a.m.-4:30 p.m. MCEAP is located at 110 Roanoke Street, Christiansburg and can be reached at 540-381-1561.

THE GIVING TREE FOOD PANTRY

This is a locally run food pantry to help those in the NRV. Doors open at 4:30 p.m. every Friday (except holidays). Distribution is from 6:00-7:00 p.m. and patrons must be present by 6:30 p.m. to receive food. The organization is located at 3385 North Franklin Street, Christiansburg

INTERFAITH FOOD PANTRY

Serves residents of Blacksburg and McCoy. 706 Harding Avenue Blacksburg. You must be screened by New River Community Action before you can receive any food assistance. Mondays between 4:30 pm and 5:30 pm or Wednesdays between 10:30 am and 11:30 am. Eligibility requirements. New River Community Action-540-382-6186

HARBOR OF HOPE

2720 Roanoke Street Christiansburg Mon-Thurs 10-3pm. No income eligibility. Once a month, 4 bags of groceries, hand-picked by client. Anita 540-577-9986.

SHAWSVILLE LAY MINISTERIAL ASSN. FOOD PANTRY

1870 Big Spring Dr. (in Old Elliston Station), Shawsville. Serves those in Elliston & Shawsville. Every 4th Thurs of month: 1-5 PM. Contact Vicky 540-397-2820

SALVATION ARMY

Mondays/Fridays12:15-1:15-Soup Kitchen. 80 college St Suite M Christiansburg, VA 24073 540-394-3233. Ronald/Rebecca Mott newrivervalleyva@uss.salvationarmy.org

DAILY BREAD-FIRST PRESBYTERIAN CHURCH

The church hosts Pulaski Daily Bread, an ecumenical program that serves mid-day community meals Monday through Friday of each week. Groceries are distributed on Monday, Tuesday and Thursday, opening at 11:00 a.m. It is advised to arrive at opening time (11:00 a.m.), where guests eat first, and then are able to fill one grocery bag per household. There are no income or residence guidelines. Located at the corner of Fourth & Jefferson Streets, Pulaski. For more information, please contact Debra Harrell at 540-980-2131

THE DREAM CENTER

This pantry is open on the last Tuesday of each month from 10:00 a.m.-noon and is located at 249 Dora Highway, Pulaski and reachable at 540-980-8880.

DUBLIN BAPTIST CHURCH FOOD PANTRY

The food pantry is open on Tuesdays and Wednesdays from 10:00 a.m.-2:00 p.m. to residents of Pulaski County. Located at 100 Hawkins Street, Dublin. Please call 540-674-6061 before coming

HERITAGE CARES FOOD PANTRY – HERITAGE CHURCH

The pantry is open every Thursday from 9:00 a.m.-4:00 p.m. Each family may receive food once a month and must have a valid ID. Located at 6195 Cleburne Boulevard, Dublin. For more information, call 540-674-9200or visit http://www.heritagechurch.net/heritage-cares-food-pantry.

IT'S ALL ABOUT JESUS OUTREACH AND HELP CENTER

Non-denominational and non-profit ministry dedicated to helping the needy in the NRV. It is a multi- denominational non-profit ministry that helps feed and clothe the people in need in the NRV. They distribute nonperishable food, baby formula, disposable diapers and all types of clothing items. Visit the Center at 1301B West Main Street in Radford or call 540-320-2307. For more information, visit www.facebook.com/Its-All-About-Jesus-Outreach-and-Help-Center-370985229592/.

JORDAN'S CHAPEL UMC- FOOD PANTRY

This pantry provides food to families in the Pulaski area in the form of food boxes, which may be requested once a month. Families must pick up food by appointment only on Tuesdays & Thursdays from 4:30-5:00 p.m. and is located at 1977 Alum Spring Road, Pulaski. For more information, please contact Angela Goad at 540-980-6958.

LITTLE CREEK FOOD PANTRY

The pantry is open on the 3rd Saturday of each month from 9:00 a.m.-noon and is located at 3984 Little Creek Road, Dublin. For more information, call 540-674-8739

RADFORD/ FAIRLAWN DAILY BREAD

The Radford/ Fairlawn Daily Bread provides meals to those who need food and/or fellowship. Meals are served Monday- Friday from 11:00 a.m.-noon. Daily Bread is located at 501 Norwood Street, Radford. For more information, call 540-639-0290.The Radford/ Fairlawn Daily Bread also provides homebound meals, "Meals on Wheels," to those in the local area. Deliveries are made right to your door Monday- Friday from 10:00 a.m.-noon. For more information about this organization, call 540-641-3883or visit http://www.radfordfairlawndailybread.org/.

HIS PROVISIONS

The Radford Worship Center has a monthly food distribution ministry called "His Provisions." Volunteers work with local grocers to provide groceries and food to low-income families in the New River Valley, free of charge. "His Provisions" distributes food on the fourth Sunday of each month at 2:00 p.m., except for November and December, which will be on the third Sunday, due to holidays. The Center is located at 1820 Second Street, Radford. For more information call 540-639-6287 or visit http://www.radfordworshipcenter.com/about/contact-us/.

VALLEY HARVEST MINISTRIES FOOD PANTRY

This pantry is open on every Wednesday, EXCEPT the first Wednesday of every month, from 9:00-10:00 a.m. and is located at 1Harvest Place, Dublin. For more information, call 540-674-4729.

NEW RIVER VALLEY AGENCY ON AGING (60 & OVER)

Congregate and Home Delivered Meals. 141 E. Main St., Ste. 500, Pulaski 540-980-7720

PLENTY FOOD PANTRY

Families who live in Floyd County can come to the Fresh Food Pantry once a week to pick up free food to feed themselves and their family. Offers Portable Produce -program that brings weekly delivery of fresh produce to your doorstep from June through Thanksgiving. Do not require any additional information for families to receive food. There are no income limits or property ownership requirements. Monday 1-4pm, Tuesday 10a-1pm, Thursday 4-630pm. 192 Elephant Curve Rd, Floyd, 540-745-3898 plenty@swva.net

MICAH'S BACKPACK

Provides direct assistance to students and families who qualify for the free lunch program. Each week during the school year, the identified students receive a backpack filled with enough food for the weekend. Low income families should contact their school principal to find out if they qualify for the program. The backpacks include two dinners, two lunches and two breakfasts**. St. Michael's Lutheran Church** 2308 Merrimac Rd. Blacksburg, Email: hope@micahsbackpack.org 540-951-8951

BEANS AND RICE

Hunger relief, after-school programs that improve educational opportunity for at-risk children, job creation for low-to-moderate income families, and savings programs that help families buy their first home and children save for education. Weekend Food for Kids Backpack Project provides food for children enrolled in afterschool and summer enrichment programs. Food distribution occurs weekly at 11AM at two low-income housing complexes. Radford: 540-633-6270, Pulaski: 540-980-4111

FLOYD COUNTY BACKPACK PROGRAM

Provides food to Floyd County children for the weekend. Application required. ksowder@nrcaa.org Kathy at (540) 633-5133, ext. 460.

RADFORD/FAIRLAWN MEALS ON WHEELS

Provides a free noon-day meal to homebound persons in Radford and Fairlawn five days a week. Any home-bound individual in the City of Radford or Fairlawn community who requests meal delivery. We don't ask anyone to explain or justify their need. There is no fee. Karen Jones, Meals on Wheels Coordinator at 540-641-3883

NEW RIVER VALLEY SENIOR SERVICES

Provides transportation services to and from nutrition programs, non-emergency medical appointments and necessary shopping trips for elderly and handicapped individuals with no access to transportation. Delivers hot meals once a day to homebound persons. Provides transportation to people with sensory or physical disabilities. 6226 University Park Drive, Suite 3100, Fairlawn, 540-980-7720 Email: mmusick@nrvss.org

CLOTHING ASSISTANCE

RADFORD CLOTHING BANK

Supplies new and used clothing free of charge throughout the New River Valley to persons in need identified by guidelines to be in financial need, including families involved in emergency situations. The August Kids program provides resources for new school clothing to disadvantaged children in Radford. Other satellite programs are the Stork Exchange and Coats for Kids. 2000 West Street Radford. Open Thursdays:10:00 a.m. – Noon and 4:00 p.m. – 6:00 p.m., Fridays: 10:00 a.m. – Noon, Saturdays: 10:00 a.m. – Noon. 540-633-5050

GILES CHRISTIAN SERVICE MISSION

Part of New River Community Action. Open M-F 9:00-11:00 & 1:00-3:00pm. Assists families with needs due to low/fixed incomes and offer emergency assistance for families. 516 Wenonah Ave, Pearisburg. 540-921-3006

IT'S ALL ABOUT JESUS OUTREACH AND HELP CENTER

Christian ministry that is staffed by non-paid volunteers from various area churches 5 days per week. It is open to those who are having financial difficulty and offers free clothing, counseling, and when available financial assistance with bills. Staff are there to pray and minister to your spiritual needs as well. For more information, please call 540-633-3992

HEALTH CLINICS

THE COMMUNITY HEALTH CENTER

Serves uninsured individuals on a sliding fee scale, as well as people who are insured with Medicaid, Medicare, and private insurance. No patient is turned away due to an inability to pay. Services provided include medical, dental (includes restorative crowns and dentures), behavioral health and medication assistance to people living in Montgomery, Floyd, Pulaski, and Giles Counties and the City of Radford. Locations in Christiansburg and Pearisburg. Montgomery Center 215 Roanoke Street, Christiansburg, 540-381-0820. Giles Center 219 South Buchanan Street, Pearisburg, 540-921-3502. Radford/Pulaski Center 5826 Ruebush Road Dublin, 540.585.1310.

PULASKI FREE CLINIC

Provide primary medical care, medications, and health education to uninsured adult residents of Pulaski County. Regular, cost-free visits with a doctor or nurse practitioner. Some medications at no cost to you. Free or reduced cost visits with specialists. 25 4th Street NW, Pulaski, 540-980-0922

HOME/SHELTER ASSISTANCE

NEW RIVER FAMILY SHELTER

Provides safe emergency housing to families and children. 110 Roanoke St Christiansburg 540-382-6188 nrfamilyshelter@gmail.com

TO OUR HOUSE

Provides temporary thermal shelter to single homeless men and women in the New River Valley during the coldest winter months from November through March and connect them with resources that lead to employment, housing, and personal economic sustainability. **Email:** toourhousenrv@gmail.com 540-382-6186

WOMEN'S RESOURCE CENTER OF THE NEW RIVER VALLEY

Provides shelter, counseling, training and prevention services for adult and child victims of domestic violence and sexual assault. Provides a 24-hour crisis hotline (639-1123) and court-related victim assistance. 540-639-1123. Public Office: 1217 Grove Ave Radford.

OTHER ASSISTANCE

NEW RIVER COMMUNITY ACTION

Programs include Head Start, Children's Health Improvement Partnership (CHIP), Homeless and Housing Programs (Rapid Re-housing, Homeless Prevention, Housing Counseling, Renter Education Workshops), VA CARES services to ex-offenders, Swift Start job training and access to child care, AmeriCorps, Emergency Assistance and Food Pantries Programs, Volunteer Income Tax Assistance (VITA), Floyd County Backpack Program and To Our House homeless men's thermal shelter. 1093 East Main Street Radford 540- 633-5133. Email: nrca@nrcaa.org

Appendix L. Copyright Permissions

Reply Reply all Forward Archive Delete Clear flag ...

RE: USDA food security module

CE **Coleman-Jensen, Alisha - ERS <alisha.coleman-jensen@usda.gov>**
1/3/2020 11:40 AM

To: Queen, Misty Cc: Rabbitt, Matthew - ERS; Gregory, Christian - ERS

Hi Misty,

Thanks for your inquiry. You do not need copyright permission to use the food security modules. All are in the public domain and we encourage their use. We do ask that you cite ERS/USDA. You can find the modules here:

Please let us know if you have questions about implementing the modules or evaluating the data.
https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/survey-tools/

Thanks,
Alisha

Is the PDF really free? Can I print some recipes?

Yes it's really free. Sharing the power of cooking is the whole point of the *Good and Cheap* project. Because the 1st edition is under a Creative Commons license, you are free to use the recipes however you like so long as you give me credit and you don't make money off my work. Enjoy it!

LB **Leanne Brown <leanne.ellen.brown@gmail.com>**
2/18/2020 10:16 AM

To: Queen, Misty

Hi Misty,

Yes you can give them out for free, that is the highest use of them and the whole point of the project.

Feel free to order them here: https://www.workman.com/features/goodandcheap/

Good luck with the study!

Leanne

Generally, data and materials produced by federal agencies are in the public domain and may be reproduced without permission. However, we do ask that any published material derived from the data acknowledge CDC's BRFSS as the original source.
Suggested Citation for Survey Questions:
Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Questionnaire. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [appropriate year].

Suggested Citation for Online BRFSS Database:
Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [appropriate year].

Appendix M. USDA Household Food Security Survey Module

USDA Household Food Security Survey Module: Three-Stage Design, with Screeners
Economic Research Service, USDA September 2012

Revision Notes: *The food security questions are essentially unchanged from those in the original module first implemented in 1995 and described previously in this document.*

September 2012:

- *Corrected skip specifications in AD5*
- *Added coding specifications for "How many days" for 30-day version of AD1a and AD5a.*

July 2008:

- *Wording of resource constraint in AD2 was corrected to, "…because there wasn't enough money for food" to be consistent with the intention of the September 2006 revision.*
- *Corrected errors in "Coding Responses" Section*

September 2006:

- *Minor changes were introduced to standardize wording of the resource constraint in most questions to read, "…because there wasn't enough money for food."*
- *Question order was changed to group the child-referenced questions following the household- and adult-referenced questions. The Committee on National Statistics panel that reviewed the food security measurement methods in 2004-06 recommended this change to reduce cognitive burden on respondents. Conforming changes in screening specifications were also made. NOTE: Question numbers were revised to reflect the new question order.*
- *Follow up questions to the food sufficiency question (HH1) that were included in earlier versions of the module have been omitted.*
- *User notes following the questionnaire have been revised to be consistent with current practice and with new labels for ranges of food security and food insecurity introduced by USDA in 2006.*

Transition into Module (administered to all households):

These next questions are about the food eaten in your household in the last 12 months, since (current month) of last year and whether you were able to afford the food you need.

Optional USDA Food Sufficiency Question/Screener: Question HH1 (This question is optional. It is not used to calculate any of the food security scales. It may be used in conjunction with income as a preliminary screener to reduce respondent burden for high income households).

HH1. [IF ONE PERSON IN HOUSEHOLD, USE "I" IN PARENTHETICALS, OTHERWISE, USE "WE."]

Which of these statements best describes the food eaten in your household in the last 12 months: —enough of the kinds of food (I/we) want to eat; —enough, but not always the kinds of food (I/we) want; —sometimes not enough to eat; or, —often not enough to eat?

[1] Enough of the kinds of food we want to eat
[2] Enough but not always the kinds of food we want
[3] Sometimes not enough to eat
[4] Often not enough to eat
[ ] DK or Refused

Household Stage 1: Questions HH2-HH4 (asked of all households; begin scale items).

[IF SINGLE ADULT IN HOUSEHOLD, USE "I," "MY," AND "YOU" IN PARENTHETICALS; OTHERWISE, USE "WE," "OUR," AND "YOUR HOUSEHOLD."]

HH2. Now I'm going to read you several statements that people have made about their food situation. For these statements, please tell me whether the statement was often true, sometimes true, or never true for (you/your household) in the last 12 months—that is, since last (name of current month).

The first statement is "(I/We) worried whether (my/our) food would run out before (I/we) got money to buy more." Was that often true, sometimes true, or never true for (you/your household) in the last 12 months?

[ ] Often true
[ ] Sometimes true
[ ] Never true
[ ] DK or Refused

HH3. "The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

[ ] Often true
[ ] Sometimes true
[ ] Never true
[ ] DK or Refused

HH4. *"(I/we) couldn't afford to eat balanced meals." Was that <u>often</u>, <u>sometimes</u>, or <u>never</u> true for (you/your household) in the last 12 months?*

[ ] Often true
[ ] Sometimes true
[ ] Never true
[ ] DK or Refused

<u>Screener for Stage 2 Adult-Referenced Questions:</u> *If affirmative response (i.e., "often true" or "sometimes true") to one or more of Questions HH2-HH4, OR, response [3] or [4] to question HH1 (if administered), then continue to* ***Adult Stage 2;*** *otherwise, if children under age 18 are present in the household, skip to* ***Child Stage 1,*** *otherwise skip to* ***End of Food Security Module.***

<u>NOTE:</u> *In a sample similar to that of the general U.S. population, about 20 percent of households (45 percent of households with incomes less than 185 percent of poverty line) will pass this screen and continue to Adult Stage 2.*

<u>Adult Stage 2: Questions AD1-AD4</u> (asked of households passing the screener for Stage 2 adult-referenced questions).

AD1. In the last 12 months, since last (name of current month), did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?

[ ] Yes
[ ] No (Skip AD1a)
[ ] DK (Skip AD1a)

AD1a. *[IF YES ABOVE, ASK] How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?*

[ ] Almost every month
[ ] Some months but not every month
[ ] Only 1 or 2 months
[ ] DK

AD2. *In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?*

[ ] Yes
[ ] No
[ ] DK

AD3. In the last 12 months, were you every hungry but didn't eat because there wasn't enough money for food?

[ ] Yes
[ ] No
[ ] DK

AD4. *In the last 12 months, did you lose weight because there wasn't enough money for food?*

[ ] Yes
[ ] No
[ ] DK

Appendix N. Overview 2015-2020 Dietary Guidelines for Americans

Table of Contents

Appendix O. *MyPlate* Guide

USDA
United States Department of Agriculture

MyPlate Plan

Find your Healthy Eating Style

Everything you eat and drink matters. Find your healthy eating style that reflects your preferences, culture, traditions, and budget—and maintain it for a lifetime! The right mix can help you be healthier now and into the future. The key is choosing a variety of foods and beverages from each food group—*and making sure that each choice is limited in saturated fat, sodium, and added sugars*. Start with small changes—**"MyWins"**—to make healthier choices you can enjoy.

Food Group Amounts for 2,000 Calories a Day

Fruits	Vegetables	Grains	Protein	Dairy
2 cups	**2 1/2 cups**	**6 ounces**	**5 1/2 ounces**	**3 cups**
Focus on whole fruits	Vary your veggies	Make half your grains whole grains	Vary your protein routine	Move to low-fat or fat-free milk or yogurt
Focus on whole fruits that are fresh, frozen, canned, or dried.	Choose a variety of colorful fresh, frozen, and canned vegetables—make sure to include dark green, red, and orange choices.	Find whole-grain foods by reading the Nutrition Facts label and ingredients list.	Mix up your protein foods to include seafood, beans and peas, unsalted nuts and seeds, soy products, eggs, and lean meats and poultry.	Choose fat-free milk, yogurt, and soy beverages (soy milk) to cut back on your saturated fat.

Limit

Drink and eat less sodium, saturated fat, and added sugars. Limit:

- Sodium to **2,300 milligrams** a day.
- Saturated fat to **22 grams** a day.
- Added sugars to **50 grams** a day.

Be active your way: Children 6 to 17 years old should move **60 minutes** every day. Adults should be physically active at least **2 1/2 hours** per week.

Appendix P. Health Educator's Nutrition Toolkit Overview

I. Objectives

- To learn how to read and use the Nutrition Facts label on packaged foods and beverages.
- To explore ways to make healthier food choices at home and while eating out.

II. Key Messages

- Small Changes Add Up.
- Healthy Cooking and Eating Start with Smart Food Shopping.
- Know Your Options When Eating Out.

III. Definitions

- Calories: the total number of calories, or "energy," supplied from all sources (fat, carbohydrate, protein, and alcohol) in a serving of the food.
- Nutrient: a substance in food that is used by the body to function and grow.
- % Daily Value (%DV): shows how much a nutrient in a serving of the food contributes to a total daily diet New, Improved Nutrition Facts Label
    - Learning Activity
        - Original Label vs. New Label: A Side-By-Side Comparison

IV. What the New Nutrition Facts Label Tells Us

- Servings per container
    - The total number of servings in the entire food package or container
- Serving size
    - The amount of a food that most people typically eat at one time.
    - The nutrition information listed on the label is based on the serving size listed on the label.
- Calories per serving
    - General guideline: 2,000 calories per day. Remember - calorie needs are different for each person.
- % Daily Value (%DV)
    - %DV = how much a nutrient in a serving of the food contributes to a total daily diet.
    - 5% DV or less of a nutrient per serving is considered low
    - 20% DV or more of a nutrient per serving is considered high.
- List of Nutrients
    - Nutrients to get less of saturated fat, *trans* fat, sodium, and added sugars.
    - Nutrients to get more of dietary fiber, vitamin D, calcium, iron, and potassium.
    - Learning Activity
        - How many calories are in one serving?
        - How many servings are in a package?

V. Facts About Fat

- What are Added Sugars?
- Where to Find Added Sugars?
- How Much Added Sugar is Too Much?
- Learning Activity
    - Bringing Nutrition into Your Daily Life
    - Healthy Cooking and Eating Starts with Smart Food Shopping
    - Nutrients to Get LESS of
    - Nutrients to Get MORE of

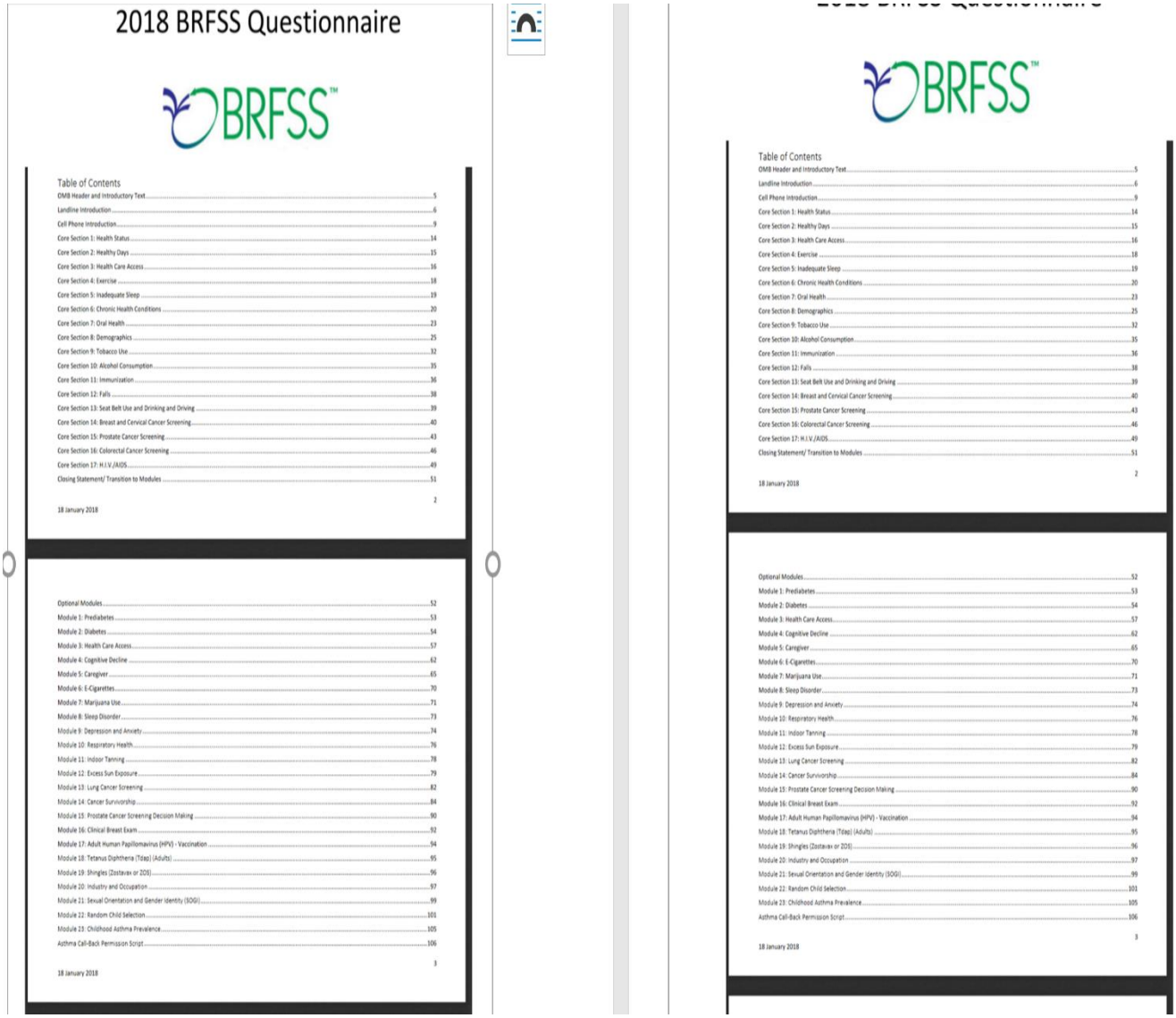
VI. Food Shopping Tips

- Check the ingredient list
- Learning Activity
    - Making Healthy Choices at Home

VII. Tips for Healthy Cooking and Eating at Home/ Options When Eating Out

Where to Find Calorie and Nutrition Information

Appendix Q. BRSS Overview



2018 BRFSS Questionnaire

BRFSS™

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BRFSS™

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Appendix R. Stakeholder Letters of Support

Sigma Theta Tau

From: Downey, Wendy <wrdowney@RADFORD.EDU>
Sent: Tuesday, April 28, 2020 8:29 PM
To: Queen, Misty <mqueen@RADFORD.EDU>
Cc: Underwood, Rebecca <runderwood3@RADFORD.EDU>; Lee, Eunyoung <elee7@RADFORD.EDU>
Subject: Re: Epsilon Psi Sigma Theta Tau Application

Dear Misty,

I am pleased to report that the board for the Epsilon Psi chapter of Sigma Theta Tau has approved your grant application and awarded funding of the entire amount requested of $1214.00. Please refer to the instructions below from the Grant Application in order to receive reimbursement for approved purchases at the completion of your project. All of the board members wish you all the best in your preparation and execution of your DNP capstone project!

Congratulations,
Dr. Downey

1. If approved, applicants are expected to purchase only those materials in the application to complete the project. Purchase above those listed in the application amount may not be considered for reimbursement.
2. Within 30 days of the conclusion of the project, applicants must:
    a. Submit signed receipts from qualified purchases and a attach these to a copy of the grant award letter.
    b. Provide the Epsilon Psi Chapter with a one to two-page final report of the project. This report can be the written report provided to the community agency or a copy of the outline presented orally to the class. (In this case, a copy of your Abstract will do)
    c. Copy and paste a photo (JPEG or single PPT slide) of the applicant or group to the top left of the written synopsis/summary of the project.
    d. These documents must be sent together in a packet to the chapter President for initiation of reimbursement.

Wendy R. Downey, DNP, MSEd, RN, CNE
Assistant Professor
President, Epsilon Psi chapter of Sigma Theta Tau
Radford University School of Nursing
PO Box 6964
Radford VA 24142
540-831-7805

Appendix R-1. Stakeholder Letters of Support

Spiritual Roots Food Bank

DwellingPlace

3325 North Franklin Street
Christiansburg, VA 24073
Phone: 540-381-5500
www.dpnrv.org

January 20, 2019

Project Review Committee
Radford University
801 E. Main St.
Radford, VA 24121

RE: The Health Implications of Food Insecurity Project

To whom it may concern:
I write on behalf of the Spiritual Roots Food Pantry an agent of Feeding Southwest Virginia. We are in support of *Moving Beyond a Clinical Setting: A Food Pantry Approach to Improve Health Outcomes for Food Insecure Populations*, evaluating the correlation of food insecurity, disease and health outcomes and by providing nutritional education and community resource awareness at local food pantries. Our mission here at the Spiritual Roots is to feed the hungry and establish dignity and freedom from a poverty mindset. This Food Insecurity Project seeks to understand the health disparities of food insecure populations and implement strategies of community resources and education which promotes our goal of not only feeding the hungry but helping them rise up to their potential as a community contributor themselves.

Through this letter, we acknowledge specific roles and responsibilities we will fulfill in the partnership. In the event that this proposal is funded and implemented, we would expect our role in the Food Insecurity Research Project to include:

- Provide access to The Dwelling Place Christian Fellowship church every third and fourth Wednesday per month over the course of a three-month study period.
- Provide access to the Spiritual Roots Community Food Pantry and its clients every third and fourth Wednesday per month over the course of the study period February 202-May 2020.

We have long since dreamed of such a service that would be paired with the food pantry to help improve the lives of our participants. We highly recommend this project and are looking forward to working with Dr. Euna Lee and Mrs. Misty Queen in reducing health disparities within the food insecure population of the New River Valley. Please contact me directly with further questions.

Sincerely,

Tullio O'Reilly, Administrator
540-381-5500- office
540-998-4958- mobile/ tullio@dpnrv.org

Appendix R-2 . Stakeholder Letters of Support

It's All About Jesus Help and Outreach Food Pantry

IT'S ALL ABOUT JESUS OUTREACH AND HELP CENTER
1301 B West Main Street Radford, VA 24141 (540)320-2307

Project Review Committee
Radford University
801 E. Main St.
Radford, VA 24121

Re: *Moving Beyond a Clinical Setting to Reduce Health Disparities: A Food Pantry Approach to Improve Health and Wellness Among Food Insecure Populations*

To Who it May Concern:

I write on behalf of the *It's All About Jesus Outreach and Help Center* in support of *Moving Beyond a Clinical Setting to Reduce Health Disparities: A Food Pantry Approach to Improve Health and Wellness Among Food Insecure Populations* project to reduce health disparities by investigating the health behaviors of food insecure populations, evaluating the correlation of food insecurity, disease and health outcomes and by providing health screening and education at local food pantries. Our mission here at the *It's All About Jesus Outreach and Help Center* is to provide food, clothing and financial support to low income individuals and families who reside in the New River Valley.

I write on behalf of the *It's All About Jesus Outreach and Help Center* in support of *Moving Beyond a Clinical Setting to Reduce Health Disparities: A Food Pantry Approach to Improve Health and Wellness Among Food Insecure Populations* project which seeks to understand the health disparities of food insecure populations and implement strategies of nutritional education and community resource awareness, which promotes our goal of making sure food is available to families in need and providing the, with as many healthy food choices as possible through the Feeding America of Southwest VA rescued food program.

Through this letter, we acknowledge specific roles and responsibilities we will fulfill in the partnership. In the event that this proposal is approved, funded and implemented, we would expect our role in the Food Insecurity Research project to include:

- Provide access to *It's All About Jesus Outreach and Help Center* to provide a setting in which to implement dietary education and community resource awareness sessions to pantry users over the course of the study time frame February 2020-May 2020.

We highly recommend this project and are looking forward to working with Dr. Euna Lee and Mrs. Misty Queen in reducing health disparities within the food insecure population of the New River Valley.

Sincerely,

Helen Blake, Director
It's All About Jesus Ministries
Cell: (540) 505-9375

Appendix R-3. Stakeholder Letters of Support

The Giving Tree Food Pantry

The Giving Tree
2455 Peppers Ferry Rd Christiansburg VA 24073
540-381-5100 email: thegivingtreefoodpantry@gmail.com

Project Review Committee
Radford University
801 E. Main St.
Radford, VA 24121

I write on behalf of The Giving Tree, in support of *Moving Beyond a Clinical Setting to Reduce Health Disparities: A Food Pantry Approach to Improve Health and Wellness Among Food Insecure Populations* project to reduce health disparities by investigating the health behaviors of food insecure population, evaluating the correlation of food insecurity, disease and health outcomes and by providing nutritional education and community resource awareness at local food pantries.

Our mission here at The Giving Tree is to do more to help those who struggle daily to feed themselves and their families. *Moving Beyond a Clinical Setting to Reduce Health Disparities: A Food Pantry Approach to Improve Health and Wellness Among Food Insecure Populations* project seeks to understand the health disparities of food insecure populations and implement strategies of community resources and education which promotes our goal of helping those in need within the community.

Through this letter, we acknowledge specific roles and responsibilities we will fulfill in the partnership. In the event that this proposal is funded and implemented, we would expect our role in the Food Insecurity Research project to include:

- Provide access to The Giving Tree food pantry for project implementation over the course of the project time frame February- May 2020.

We highly recommend this project and are looking forward to working with Dr. Euna Lee and Mrs. Misty Queen in reducing health disparities within the food insecure population of the New River Valley.

Sincerely,

Kim Bowman

Appendix S. IRB Approval Letter

RADFORD UNIVERSITY

Radford University's Institutional Review Board
P.O. Box 7015 Radford, VA 24142 | Phone: (540) 831-5290 | irb-iacuc@radford.edu

01-May-2020

TO:	Eunyoung Lee
STUDY TITLE:	Moving Beyond A Clinical Setting to Reduce Health Disparities: A Food Pantry Approach to Improve Health and Wellness Among Food Insecure Populations
IRB REFERENCE #:	2019-217 / FY20-080
RE SUBMISSION TYPE:	Amendment
ACTION:	Amendment Approval
APPROVAL DATE:	01-May-2020

The proposed amendment to modify the consent and conduct of the study to accommodate verbal consent and use of Zoom during the covid-19 pandemic 'shutdown' for the above-referenced study have been approved by Radford University's Institutional Review Board (IRB).

The amendment has been granted approval under Expedited Category 7: Research is on individual or group characteristics of behavior (including, but not limited to research on perception, cognition, motivation, identity, communication, cultural beliefs or practices, and social behavior) or the research employs survey, interviews, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies). for its original term ending on 26-February-2021.

Receipt of authorization from the outside agency authorizing a return to normal study conduct is needed prior to resuming conduct in the original approved protocol.

If you wish to continue your research beyond this date, you must request a continuance no later than 10 days prior to the expiration of this approval. Please note that if your research includes stamped materials, they will be provided with this letter and must be used when conducting your research. Should you need to make changes in your protocol, please submit a request for amendment before implementing the changes. Amendments must be submitted via the IRBManager system. Please contact our office for assistance, if needed.
As the principal investigator for this project, you are ultimately responsible for ensuring that your study is conducted in an ethical manner. You are also responsible for filing all reports related to this project.

If you have any questions, please contact the Research Compliance Office at 540.831.5290 or irb-iacuc@radford.edu. Please include your study title and reference number in all correspondence with this office.

Good luck with this project!
Anna Marie Lee, MHA, CPIA AML
Research Compliance Manager
Radford University

Radford University IRB
Approval Date:01-May-2020

Appendix T. Project Budget

Item	Item Cost	Total Category Cost
Printed Study Materials		**$630.00**
Recruitment Flyers Surveys Education Materials Informed Consents Community Resource Directory	300 Color copies (1pg) = $100 300 B/W copies (11pgs) =$300 300 B/W copies (1pg)=$50 300 B/W copies (1pg)=$50 64 B/W stapled copies (16pgs)=$130	
Participation Incentives		**$584.00**
Good and Easy Cookbooks	(2 boxes) $180 per box of 36=$360	
Healthy Snacks	$1.50 per snack x 64=$96	
Giftbags	$2 per bag x 64= $128	
Total Budget Need		**$ 1214.00**

Appendix U. Project Variables

Study Variables

Demographics	Socioeconomics	Comorbidity	FI Variables	Health Behaviors	Effectiveness of Intervention (Pre/Post)
Age	Employment	Diabetes	FI Score	Primary Care Access/Utilization	Knowledge on healthier diet
Gender	Education level	Hypertension		Hospitalizations/ER Visits	Confidence/Attitude for Healthier Diet Prep
Race	Income level	High Cholesterol		Medication Compliance: HTN, DM, Cholesterol	Awareness of Community Resources (e.g. food/clothing/housing/health assistant program)
	Insurance type				Use (intention to use) of community resources (In the past 3 months vs. for the next 3 months)
	Household #				
	Transportation				
	Internet Access				
	Pantry Use before COVID-19				