Reducing the Intake of Red and Processed Meats in Food Pantry Consumers

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Abstract

*Background:* Nutrition interventions are powerful tools to prevent chronic disease and improve health outcomes. Often, these affect the more socioeconomically advantaged populations disproportionately, widening the gap in health disparities. Of the interventions studied, those with several approaches attempting to reach a smaller target were the most effective. Targeting people in their natural environment has been proven effective to increase the power of education.

*Purpose:* The purpose of this project was to assess whether an evidence-based educational nutrition intervention that involved visual cues within the pantry setting, samples of plant-based food, and an educational nutrition resource pack designed for low income populations would affect the protein intake habits of those served by the food pantry. Because red and processed meats are often overconsumed, pose multiple health risks, and are perceived to be healthy by some populations, the objective selected was to reduce the intake of red and processed meats by substituting healthier protein sources such as poultry, fish, eggs, low-fat dairy products, legumes, soy products, and meat alternatives.

*Methods:* The intended methods to achieve this outcome involved a food pantry setting, changing the interior of the food pantry by prominently displaying health-promoting posters, and providing patrons with samples of plant-based food. Resource packs containing nutrition information, food budgeting information, healthy plant-based recipes, and family activities would have been included with the grocery rations of
participants. Food frequency questionnaires before and after the intervention would have calculated the intakes of different high-protein foods.

Implementation Plan/Procedure: The outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic prevented implementation. Due to dramatically increased food insecurity with a collapse in the normal support systems that maintained the operation of the food pantry, the implementation was cancelled. The health risks of breaching social distancing guidelines per the Centers for Disease Control and Prevention also cannot be overstated. Because SARS-CoV-2 has been unpredictable and causing severe illnesses and even death, all parties agreed that in the best interest of public health, the project could not continue. The food pantry will be provided with resource packs to distribute as they see fit.

Implications/Conclusion: The resource packs remain valid at this time and can be distributed to food pantries as needed. The remaining components of the intervention could be provided to food pantries as social distancing guidelines permit. The resource packs can be modified according to needs of local areas and could potentially be customized to the needs of each user.

Keywords: nutrition education, food insecurity, food pantry, food bank, red meat, processed meat, health outcomes
Reducing the Intake of Red and Processed Meats in
Food Pantry Consumers through Recipes and Education

Food pantries and food banks support public health ensuring adequate nutrition
to maintain basic health by distributing groceries to food insecure families (Bazerghi,
McKay, & Dunn, 2016). Despite these efforts, the diet qualities of food insecure people
remain tenuous at best (Duffy, Zizza, Jacoby, & Tayie, 2009; Holben, 2006; Simmet,
Depa, Tinnemann, & Stroebele-Benschop, 2017). Obesity rates and chronic illness rates
are increased for those who lack food security, compared to those with food security
(de Ridder, Kroese, Evers, Adriaanse, & Gillebaart, 2017; Holben, 2006). Because food
pantries rely on donated food, the quality of this food may not provide the nutrient
density to support the health of the intended recipients, who are often poorly nourished
and have increased rates of acute and chronic disease (Duffy, et al., 2009; Holben,
2006). Food insecure populations tend to consume convenience foods and fast foods in
greater proportions than their food secure counterparts (de Ridder, et al., 2017; Mousa
& Freeland-Graves, 2019; Shanks, 2016; Slawson, Fitzgerald, & Morgan, 2013; Vaccaro,
Zarini, & Huffman, 2018). These convenience foods and fast foods tend to be
carcinogenic, obesogenic, and contain addictive components (de Ridder, et al., 2017;
Mousa & Freeland-Graves, 2019; Shanks, 2016; et al., 2013; Vaccaro, et al., 2018).

Carcinogenic foods are those that are known to cause cancer such as processed meats,
certain fish, and some artificial sweeteners (Harvard T. H. Chan School of Public Health,
2019b). Obesogenic foods are those that promote obesity, such as sugar-sweetened
beverages and “fast food” (Harvard T. H. Chan School of Public Health, 2019a).
Because carcinogenic and obesogenic foods are more shelf-stable and often lower in cost than fresh, nutrient dense foods, increased relative consumption of these places the food insecure at increased risk for diabetes, cardiovascular disease, and reduced overall physical and mental health. Families with little time for food preparation, few kitchen tools, and limited cooking and meal planning skills likely rely on nutrient poor convenience foods to feed their families, reinforcing the habits of quick, easy meals that satisfy the palate but contribute to obesity and disease (Dave, Thompson, Svendsen-Sanchez, & Cullen, 2017; Di Sebastiano, Murthy, Campbell, Desroches, & Murphy, 2019; Harvard T. H. Chan School of Public Health, 2019a; Wright, et al., 2018).

Several studies have found that nutrition education in a food pantry setting improves food safety, increases the intake of fruits and vegetables, and reduces overall food insecurity (An, et al., 2019; Wright, et al., 2018). Food banks feed over 46.5 million Americans annually, making nutrition interventions within them an integral part of public health outcomes (An, et al., 2019; Wright, et al., 2018).

**Overview**

**Background**

Food insecurity affects 1 in 7 American families who are often dependent on supplemental food programs such as the Federal Supplemental Nutrition Assistance Program (SNAP), the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and volunteer-run food pantries (An, et al., 2019). Because WIC is intended for pregnant women and children under the age 5, men, nonpregnant women, homeless people, and undocumented immigrants are not eligible for WIC, which
FOOD PANTRY NUTRITION

provides a limited selection of foods based on the recipient’s age and breast-feeding status (Nebraska Department of Health and Human Services, 2019; U.S. Department of Agriculture Food and Nutrition Service, 2018; U.S. Department of Labor, 2019). People who have committed felonies in some states and undocumented immigrants are ineligible for SNAP benefits, which provide a nearly unlimited food selection, but limit the food budget to the allocated monthly amount (Nebraska Department of Health & Human Services, 2018; Paresky, 2017; Tuttle, 2019). People with severe mental illness, lack of transportation, or other barriers may not receive benefits from these programs, despite eligibility (Simmet, et al., 2017). Food pantries and meal programs can fill in the gaps for those who are food insecure. Although food pantries are generally intended as supplemental food sources in emergencies, many users rely on food pantries on a regular basis (Simmet et al., 2017).

Food pantry clients tend to have reduced diet quality, increased rates of obesity, and increased levels of food insecurity compared to people who do not utilize food pantries (Simmet, et al., 2017). Most food pantry clients have diets that do not meet current guidelines for fruit and vegetable intake, fat and sugar intake, and beverages sweetened with sugar or high fructose corn syrup (Duffy, et al., 2009; Simmet, et al., 2017). With most chronic diseases having a dietary factor, and diet quality the most significant risk factor for disability and premature death, nutrition is a critical element to health (Dietary Guidelines Advisory Committee, 2015; Hemler & Hu, 2019; Katz, 2019; Locke, Schneiderhan, & Zick, 2018; Shlisky, et al., 2017; Trijsburg, et al., 2019). The World Health Organization (WHO) (2020) estimates that correction of lifestyle factors
that contribute to disease (sedentary lifestyle, poor nutrition, and smoking) would reduce the risk of the most common chronic diseases by 80% and significantly reduce health care spending (Katz, 2019; Liberato, Bailie, & Brimblecombe, 2014; Shlisky, et al., 2017). In the 2016 Global Burden of Disease study, almost 20% of worldwide deaths and 10% of disability-adjusted life years were attributed to dietary factors (Gakidou, et al., 2017). Over 90% of diabetes is estimated to be preventable with proper diet and exercise (Kramer, 2019). Improper nutrition plays a role in chronic disease that outweighs the risks of using tobacco, alcohol, illegal drugs, and unsafe sex combined (Willet, et al., 2019). The most impactful dietary change associated with decreased disease risk is the reduction or elimination of red and processed meats (Clark, Springmann, Hill, & Tilman, 2019). Primary prevention is the gold standard of health care and nutrition significantly impacts primary prevention efforts (Locke, et al., 2018; Slawson, et al., 2013). Proper nutrition is a cornerstone to reducing the risk of cardiovascular disease, diabetes, cancer, osteoporosis, and several other disease processes (Bliss, 2016; Dietary Guidelines Advisory Committee, 2015; Kramer, 2019; Locke, et al; 2018; Slawson, et al., 2013; Trijsburg, et al., 2019). Health promotion and primary prevention are key elements of nearly all of the Healthy People 2020 objectives (HealthyPeople.gov., 2019; Slawson, et al., 2013). Unfortunately, most people in one survey are receiving conflicting messages and/or messages from unreliable sources regarding nutrition recommendations (Di Sebastiano, et al., 2019)

For food insecure households, time constraints, lack of kitchen knowledge and equipment, and the demands of feeding family members with specific dietary needs can
be burdensome (Caspi, et al., 2019). The very nature of poverty can contribute to adiposity and poor nutrition, which perpetuates poor health outcomes, thus increased health spending causing increased poverty (Derrickson, Buchanan, Asing, & Okuma, 2003; Hoisington, Shultz, & Butkus, 2002). Because high calorie, low nutrient foods are generally less expensive than their low calorie, high nutrient density counterparts, the nutrition of low-income, food-insecure populations is at risk (Drewnowski & Specter, 2004; Hemler & Hu, 2019; Liberato, et al., 2014). Even with interventions such as SNAP, WIC, and food pantries, the nutritional quality of the foods consumed by food pantry clients remains low (Simmet, et al., 2017). When health is the primary factor in decision-making, different neurological pathways are activated compared to when taste or convenience are the primary factors (Gustafson, Kent, & Prate, 2018). Taste information is processed quickly, whereas health information is processed slowly, leading already stressed individuals to making less than healthy choices (Gustafson, et al., 2018).

This project sought to explore low-cost interventions to improve nutrition literacy and provide food pantry clients with education and tools to improve their nutrition status, thus improving population health. More specifically, this project aimed to assist those who are food insecure with replacing red and processed meats in the diet with healthier protein sources such as poultry, seafood, eggs, beans, and/or tofu. Because red and processed meats have been found to be carcinogenic and linked to heart disease, obesity, diabetes, kidney disease, cancer, and other health conditions, replacing these with healthier alternatives would have assisted the food insecure in
improving overall health (Carr, et al., 2017; Clark, et al, 2019; Cross, et al., 2011; Diep, 2018; Hemler & Hu, 2019; International Agency for Research on Cancer, 2019; Jeyakumar, Dissanbandara, & Gopalan, 2017; Locke, et al., 2018; Solimini, Lombardi, Palazzo, & DeGuisti, 2016). Diets that have been proven to enhance overall health all emphasize deriving nutrients from fruits, vegetables, and lean protein sources that minimize red meats (Locke, et al, 2018). Evidence has shown that the most effective nutrition interventions involve an array of methods aimed at small targets and suggest that unhealthy foods be replaced with healthier foods rather than simply eliminating them (Vaccaro, et al., 2018).

**Problem Statement**

Because the dangers of processed and red meats include a variety of cancers, diabetes, cardiovascular disease, obesity, and potentially other threats to health, processed and red meats were selected as the target of this project. The objective was to replace these with plant-based proteins or leaner, healthier protein sources. The clinical question to be answered by this project was, “in consumers who utilize the food pantry, how does education about red and processed meats, alternative protein sources, samples of plant-based foods, and supportive recipes affect the consumption of these foods within two food pantry visits?”.

**Purpose Statement**

The purpose of this project was to assess whether an evidence-based educational nutrition intervention that involved visual cues within the pantry setting, samples of plant-based food and an educational nutrition resource pack designed for
low income populations would affect the protein intake habits of those served by the food pantry.

Outcomes

Qualifying adults would have completed a short food frequency questionnaire pre-intervention and post-intervention. The questionnaires were to be done at a midwestern pantry site using a food frequency recall questionnaire that included high-protein foods consumed by the respondents for the previous week. The plan to replace red and processed meats with alternative protein sources was derived from the recommendations of the 2015 Dietary Guidelines Advisory Committee Report (Dietary Guidelines Advisory Committee, 2015). Outcomes intended to be measured would have included decreases in the consumption of red and processed meat and increases in the consumption of poultry, seafood, eggs, low-fat dairy products, and plant-based protein sources such as beans, legumes, tofu, and tempeh.

Review of the Literature

A keyword search was performed in three electronic databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane Complete Library, and MedLine Complete. Search phrases included “nutrition education” AND “food insecurity”, and “nutrition education” AND “food pantry/bank”. Articles were limited to those published in 2010-2019. The decision to narrow the focus for this project led to a second search of resources specific to red and processed meat consumption, with search phrases including “red meat” AND “health outcomes” and “processed meat” AND “health outcomes”. Articles published in 2015-2019 were used for this secondary
search. Through the Nebraska Methodist College John Moritz Library, all three database searches were completed simultaneously with duplicate articles eliminated. The unique articles found totaled 1,763 for the first set of search terms and 763 for the second set. Each set was then screened by title and abstract for applicability to the research question. Over one thousand articles that involved health outcomes as goals or were obviously not applicable to a food pantry environment were eliminated. Articles that supported the reduction of red or processed meat combined with other interventions (i.e. exercise) were also eliminated. Much of the literature regarding food pantry use provided valuable background information but lacked an intervention. Another 242 articles were found to be commentaries on studies or editorial opinions. The remaining 87 articles that potentially involved nutrition interventions were read in full text for applicability to the capstone project. Of the 87 articles read, 24 were interventions that contributed viable information to the capstone project. The remaining 63 articles which were excluded were most frequently discarded due to multiple confounding variables and interventions that involved policy changes that lacked duplicability. For articles that were closely related to the scholarly project, a search of references was conducted, with appropriate articles being similarly screened for applicability. The literature search map can be found in Appendix A.

The general characteristics of the 24 articles included in the review of literature can be found in Appendix B, literature matrix. Ten articles were systematic reviews of the literature regarding food bank interventions and other interventions aimed at improving the nutritional intake and status of a variety of populations. Seven of these
systematic reviews were published after 2014; the remaining three were published in 2009-2013. One randomized controlled trial examined a specific grocery intervention that could be applied somewhat to a food pantry. Six of the studies were cohort studies or pre/post intervention studies without randomization. Three studies were qualitative or observational in nature and four were case studies. Apart from four studies, all studies examined have been published since 2010. Most of the research examined targeted a slightly different angle from other studies, painting a vivid picture of the unique needs of the food insecure and assessing a variety of ways to improve the nutritional status of those served.

Multiple researchers have determined that non-communicable disease is the largest cause of morbidity and mortality worldwide (An, et al., 2019; Bull, et al., 2018; McGill, et al., 2016; Willet, et al., 2019). Among food pantry patrons in the United States, nearly 60% of households include a member with hypertension and another third included a member with diabetes (Wetherill, White, & Seligman, 2019; Wilson, Swigert, & Wansink, 2017). Nutrition-related chronic diseases tended to affect the food insecure more prevalently than those with more resources (Dietary Guidelines Advisory Committee, 2015; Holben, 2006; Wetherill, et al., 2019). Paradoxically, those most at risk for hunger tend to be overweight and obese partially attributable to the binge/fast cycles needed when food is scarce and due to the low nutrient quality of affordable foods (Dave, et al., 2017; Drewnowski & Specter, 2004; Orenstein, 2014). The prevention of diabetes, cardiovascular disease, obesity, and many cancers is justifiably
an enormous concern of public health officials, health care providers, and economists (HealthyPeople.gov, 2019; McGill, et al., 2016).

**Addressing Inequities**

Nutrition contributes extensively to the leading causes of morbidity and mortality in the United States and those with low socioeconomic status are disproportionately affected by a reduced nutrition status and increased health care needs (Bull, et al., 2018; Centers for Disease Control and Prevention, 2017; Dietary Guidelines Advisory Committee, 2015; McGill, et al., 2016). While thousands of efforts have been designed to reduce the causes of obesity, cardiovascular disease, and other health ailments by improving the nutrition of Americans, many nutrition education programs disproportionately favor those with a socioeconomic advantage (Friel, Hattersley, Ford, & O'Rourke, 2015). Access to healthy foods, education about the health effects of diet, and affordability all contribute to this disparity (Escaron, Meinen, Nitzke, & Martinez-Donate, 2013; McGill, et al, 2016). Providing nutrition interventions within the food pantry environment theoretically reduces health disparities by targeting a vulnerable population who may not otherwise benefit from interventions designed for more food secure households (An, et al., 2019; Friel, et al., 2015). Disparity reduction can best be achieved by narrowly targeting populations at risk for food insecurity, those with low socioeconomic status, and creating an environment where pricing strategies favor the affordability of healthy foods (Friel, et al., 2015; McGill, et al., 2016). Closing the divide in nutrition between the advantaged and the disadvantaged requires “double-sided financial incentives” and/or programs that specifically target the most
vulnerable populations (Friel, et al., 2015). Policies that increase taxes of unhealthy foods to reduce the purchasing and consumption of unhealthy foods, but without an incentive to purchase healthy foods, would likely place increased financial burden on those at risk for hunger (Friel, et al., 2015).

Other appropriate mechanisms to reduce nutrition disparities include self-monitoring of eating and activity habits, reducing the duration of nutrition interventions, and encouraging goal accomplishment (Bull, et al., 2018; Derrickson et al. (2003). Increasing kitchen skills alone failed to improve food security in one study (McLaughlin, Tarasuk, & Kreiger, 2003). McGill, et al., (2016) further found that an inverse relationship exists between the amount of individual effort required by an intervention and the degree of disparity reduction. Motivation to change seems to drive nutrition changes more than the interventions themselves (McGill, et al., 2016). Many studies revealed low participation rates, possibly indicating that food insecure populations have more pressing concerns than improving nutrition (Ball, et al., 2016; Barnidge, et al., 2015; Gustafson, et al., 2018; Hoisington, et al., 2002; McGill, et al., 2016).

**Interventions to Increase Intake of Specific Foods**

Multi-component, environmental, and educational interventions showed greater success than other interventions that aimed to increase vegetable intake (Appleton, et al., 2016; Kleemann, Cunningham, Slattery, and McEvoy, 2008). Interventions targeting one isolated food-related behavior and those with many components showed the most promise (Gaines & Turner, 2009). While several interventions studied did increase
acceptability and intake of vegetables, the effects were inconsistent and typically minimal (Appleton, et al., 2016). Interventions involving the whole family and those with participatory elements were superior to those limited to curriculum only, although increasing nutrition knowledge alone successfully increased the consumption of fruits and vegetables in one study of low-income residents of Ireland (Gaines & Turner, 2009; Kleemann, et al., 2008). Long-term education and repeated exposures to vegetables increased the tolerability and willingness to consume previously disliked vegetables, particularly in children (Appleton, et al., 2016). Interventions targeted at teens, older adults, those at risk for chronic disease, and those of low socioeconomic status would be beneficial, as most nutrition interventions target healthy adults (Appleton, et al., 2016).

Social cognitive theory allowed the researchers to adapt their interventions as needed and was the basis for many interventions (Barnidge et al, 2015; Gaines & Turner, 2009). Barnidge et al. (2015) concluded that participants who were highly engaged in the program had much more success at reaching nutritional goals than those who opted not to participate, supporting the work of McGill, et al. (2016). Despite participation rates below 30% in each of the counties studied by Barnidge et al (2015), rates of hypertension of the whole group dropped from 61% pre-intervention to 45% mid-intervention and the rates of obesity dropped by nearly 10% in the intervention county, supporting the 2016 theory by Appleton et al., that nutrition interventions effectively impact health outcomes (Appleton, et al. 2016; Barnidge, et al., 2015).
The most impactful research regarding children’s intakes occurred in school settings and contained components that required work outside the school setting (Gaines & Turner, 2009). They found that despite even the most effective interventions, results were modest enough that the students did not consume the daily USDA recommended amount of fruits and vegetables after any of the interventions studied. When participants were provided only improved access to fruits and vegetables, they showed a slight decline in intake of fruits and vegetables, whereas nutrition education alone proved to increase intake of the same (Barnidge, et al., 2015; Kleemann, et al., 2008). This research supports the use of the food pantry as the location for an intervention aimed at those with food insecurity.

**Food Pantry Based Interventions**

A systematic review of food pantry-based interventions showed that all 12 interventions studied effectively improved clients’ diet-related outcomes (An, et al., 2019). Because food pantries serve over 46.5 million Americans each year, they can be a natural setting for diet-related interventions for those with low food security (An, et al., 2019). The interventions studied impacted the diets, cooking abilities, health knowledge, health outcomes such as glycated hemoglobin (HbA1c), and nutrition knowledge (An, et al., 2019). Providing nutrition interventions within the food pantry environment reduces health disparities by targeting a vulnerable population who may not otherwise benefit from interventions designed for more food secure households (An, et al., 2019; Baker, et al., 2014; Friel, et al., 2015).
Wilson et al. (2017) found that product placement and appearance can alter the choices made by food pantry clients, which supports work by Ball, et al (2016) and Liberato (2014) who had similar results in retail environments. Clarke, Evans, and Hovy (2011) evaluated the effects of customizing nutrition information and recipes for food pantry clients compared with distributing generic booklets. The researchers noted multiple studies that indicated customized messages are more effective at behavior change than generic messages, supporting the work of Ogawa et al. (2011) (Baker, et al., 2014; Clarke, et al., 2011).

Caspi, et al. (2019) sought to evaluate a food pantry program designed to increase the nutritional value of the foods available while using behavioral economics approaches such as product placement and consumer pathways to increase the nutritional value of the foods selected by patrons of the food pantries. The researchers used the Healthy Eating Index 2010 (HEI-2010) to measure both the nutritional values of the foods brought into the pantries and the foods selected by the patrons. The HEI-2010 scores of the foods selected climbed from a baseline of 54.13 to 65.9 following the changes in product placement and pathways through the pantries, with the most gains in vegetables, whole grains, and fatty acid ratio (Caspi, et al.2019). In the control sites, the HEI-2010 scores decreased (Caspi, et al., 2019). Most of the clients studied used the food pantry as their primary source of food, but actual nutrient intake was not studied (Caspi, et al.,2019).

Wetherill, et al. (2019) found that food pantries can best serve their intended populations by increasing nutrition knowledge of their clients, providing mobile food
banks to reach more difficult geographical areas, and partnering with other health agencies to collaborate on education and food distribution. Systematic reviews of the literature regarding interventions designed to improve the nutrition status of food-insecure people consider simple strategies such as grocery store marketing to complex programs to assist families with budgeting, nutrition, and home management (Wetherill, et al., 2019).

**Other Interventions**

Liberato et al. (2014) found that altering the food shopping environment to reduce impulsive purchasing decisions, bringing healthy foods to the front of the store and on aisle endcaps, and promoting healthy foods through samples, coupons, and signage were effective methods of promoting the purchase of healthier foods. Specific, concrete, healthful messages to consumers are theorized to alleviate some of the decision-making, allowing consumers to make healthier decisions when compared to vague messages (Gustafson, et al., 2018).

An intervention among disadvantaged Australian adults provided a grocery store tour and eight resource packs which included information about budget planning, meal planning, increasing nutrition confidence and family involvement in fruit and vegetable preparation (Ball, et al., 2016). Educational website links and other supplemental information were also included. Like McGill, et al. (2016), Ball, et al. (2016) found that participants who were more engaged with the materials had significantly more fruit and vegetable intake than less involved participants. Prior to the intervention, participants self-reported averages of 1.8 servings of vegetables and 1.6 servings of fruit, far less
than the recommended five and two servings, respectively (Ball, et al., 2016). Although the purchasing of fruits and vegetables remained stagnant, consumption of vegetables in the intervention group increased by 0.5 servings daily over the control group (Ball, et al., 2016). An increase of fruits and vegetables by 0.5 servings daily has been linked with a 20% reduction in all-cause mortality risk with additional cardiovascular benefits for each additional serving (Ball, et al., 2016). The effects of this intervention waned slightly over the six months studied, but overall results showed much promise (Ball, et al., 2016).

Ogawa et al. (2011) evaluated an intervention that included posters, recipes, and health information about fruits and vegetables posted prominently in strategic locations at the intervention store. Sales data was monitored before, during, and after the intervention, although purchasing healthy foods may not correlate with the consumption of these foods (Ball, et al., 2016; Ogawa, et al., 2011).

**Special Considerations for Food Insecure Populations**

Mousa and Freeland-Graves (2019) published a qualitative study reporting characteristics that interfere with food security. They found the most food insecure populations by race were African American or Hispanic populations with increased health disparities (Centers for Disease Control and Prevention, 2017; Mousa & Freeland-Graves, 2019). The researchers also noted that people with criminal records or lacking citizenship were ineligible to receive safety-net programs such as SNAP (Mousa & Freeland-Graves, 2019). People with food insecurity were more likely to be overweight, smoke, drink alcohol, suffer chronic health conditions, and have shorter lifespans, which
correlates with the work of Gustafson, et al. (2018) who proposed that the stresses of poverty interfere with healthy decision-making (Mousa & Freeland-Graves, 2019). Based on HEI-2010 scores, those with food insecurity consumed a less healthy diet than those with food security (Mousa & Freeland-Graves, 2019). Low nutritional knowledge was associated with food insecurity, although 98% of those with food insecurity were knowledgeable about public health resources such as WIC and SNAP (Mousa & Freeland-Graves, 2019). Increasing nutritional knowledge alone can improve food security (Adam & Jensen, 2016; Baker et al., 2014; Ball et al., 2016; Gaines & Turner, 2009). Most low-income food-insecure pantry clients in Houston, Texas expressed a desire for improved health for themselves and their families (Dave, et al., 2017). The barriers reported by this population included a lack of nutritional knowledge, time constraints, lack of transportation, and a lack of social support (Dave, et al., 2017). Although all the participants studied received SNAP benefits, most felt this was inadequate to maintain enough food throughout the month (Dave, et al., 2017). Less than half of the group had vegetables in the home and 26% reported having fruit available in the home (Dave, et al., 2017). Over 33% of the group had sugar-sweetened beverages in the home, but 13% had low-fat dairy products (compared to 47% with whole or 2% dairy products) (Dave, et al., 2017). All of the participants reported using the food pantry at least monthly and all the participants were either overweight or obese. As other studies have reported, nutrition education must be sensitive to the culture, abilities, time limits, and tools available to those served. (Baker, et al., 2014; Dave, et al., 2017; Friel, et al., 2015; Mousa & Freeland-Graves, 2019).
The United States Department of Agriculture Food and Nutrition Service identified five domains of nutrition education targeted at low-income populations (Baker, et al., 2014). The twenty-eight best practices cited were evidence-based and sought to unify nutrition education system-wide (Baker, et al., 2014). The five domains provided guidance for recommendations for program design and delivery, educator characteristics and training, and program evaluation (Baker, et al., 2014). This report recommends using evidence-based interventions that are appropriate for the audience, include goal setting components, and based on behavior change theories. Literacy considerations and policy supports must also be considered (Baker, et al., 2014). Programs should support a variety of learning styles and have frequent points of contact (Baker, et al., 2014). The basis of educational programs must have specific objectives and maintain fidelity to the objectives, preferably within the context of a collaborative community effort. Outcomes need to be measured consistently for impact, possible revisions, goal attainment and fidelity to the outcomes (Baker, et al., 2014).

**Literature Supporting Reduction of Red and Processed Meat**

Overwhelming evidence indicts both red and processed meats as agents of multiple avenues of morbidity and mortality (Centers for Disease Control and Prevention, 2017; Clark, et al., 2019; Dietary Guidelines Advisory Committee, 2015; Dinu, Pagliai, & Sofi, 2017; Grosso, et al., 2017; Kim, Caulfield, & Rebholz, 2018; Larsson & Orsini, 2014; Springman, Godfray, Rayner, & Scarborough, 2016; Whalen, et al., 2017; Willet, et al., 2019; Vaccaro, Zarini, & Huffman, 2018; Zezelj, Jovanovic, Zubalj, Mivovic, & Sesar, 2018). The majority of other food groups: poultry, seafood, dairy products,
and fruits have mixed evidence regarding their role in disease processes (Dinu, et al., 2017). While vegetables and whole grains have been demonstrated to benefit overall health, neither reveal the overwhelming evidence that red and processed meats have. Increasing fruits, vegetables, and whole grains have an overall impact on improving health and reducing obesity, but cannot negate the harm done by red and processed meats (Vaccaro, et al., 2018; Yu, et al., 2016). Red and processed meats increase systemic inflammation, homocysteine levels, C-reactive protein levels, sodium levels, and hemoglobin A1c levels (Vaccaro, et al., 2018; Yu, et al., 2016).

**Cancer risk.** In 2015, the International Agency for Research on Cancer evaluated the effects of red and processed meat on cancer (International Agency for Research on Cancer, 2018; 2019). The 22 scientists from ten countries concluded that processed meat is a Level I carcinogen, definitively causing cancer (Bouvard, et al., 2015). The committee also concluded that unprocessed red meat is a likely carcinogen with a level II rating (IARC, 2019; Bouvard et al., 2015). The World Cancer Research Fund International (2017) also acknowledges the cancer risk associated with red and processed meats and thus recommends limiting red meat consumption to under 300 grams per week and to reduce the intake of processed meat as much as possible. Although the mechanisms are not discretely known, the most frequent source of damage to cellular DNA is through oxidative stress and inflammation, both known to occur with an increased intake of red meat (Kasielski, Eusebio, Pietruczuk, & Nowak, 2016; Whalen, et al., 2017). Heme iron found in red meat has been shown to cause lipid peroxidation which is known to damage DNA strands (Chen, Lv, Pang, & Liu, 2013;
Nitrite, N-nitroso compounds, and sodium nitrate, commonly found in red and processed meat, have been linked with increased risk of colorectal cancer (Chen, et al., 2015). Saturated fatty acids further increase DNA injury (Kasielski, et al., 2016). Of the multiple factors studied examining DNA telomere length, only red meat consumption was associated with this genetic change (Kasielski, et al., 2016).

In evaluating cancer risk in a longitudinal study, people who developed cancer of any kind also reported the highest levels of beef intake (Orenstein, Chetrit, & Danker, 2016). The focus of one food group fails to account for the interplay between macronutrients, micronutrients, body systems, and nutrient combinations, but red meat and processed meats have been inextricably linked to cancer, particularly colorectal cancer (Bellavia, Stilling, & Wolk, 2016; Chen et al., 2015).

Colorectal cancer is the cancer most closely linked to increased consumption of red and processed meat (Bouvard, et al., 2015; Chapman, Jacobs, & Braakhuis, 2019; Islami, et al., 2018; Solimini, et al., 2016; Thompson, et al., 2018). For every 50 grams of processed meat consumed daily, the risk of colorectal cancer escalates by 18% (Gapstur, et al., 2018). For every 100 grams of unprocessed red meat consumed daily, this risk climbs by 17% (Gapstur et al., 2018). After a diagnosis of colorectal cancer, those who consumed higher intakes of red and processed meats had significantly reduced disease-free survival (Chen et al., 2015). Bernstein et al. (2015) found that unprocessed red meat was weakly associated with proximal colon cancer, but processed red meat was significantly associated with distal colon and rectal cancers.
In addition to colorectal cancer, the intake of red and processed meats have been linked closely with cancers of the breast, bladder, lung, stomach, and non-Hodgkin’s lymphoma (Colditz, Philpott, & Hankinson, 2016; Crippa, Larsson, Descacciati, Wolk, & Orsini, 2016; Guo, Wei, & Zhan, 2015; Islami, et al., 2018; Orlich, et al., 2019; Rice, et al., 2016; Solimini, et al., 2016; Springman, et al., 2016; Wang, et al., 2016). Solimini et al. (2016) theorized that red meat consumed in excess overstimulates the immune system, raising the risk of lymphomas or increasing susceptibility to certain carcinogenic pathogens. Phytanic acid contained in ruminant meat has also been implicated as a risk factor in non-Hodgkin’s lymphoma (Solimini, et al., 2016). Colditz, et al. (2016) and Rice et al. (2016) both found a link between adolescent red meat intake and premenopausal breast cancer and also found that fiber and fruit intakes during the teen years can reduce breast cancer risk in premenopausal women. One meta-analysis found an increased risk of lung cancer among non-smokers who consumed red meat, although this finding was not replicated in the instance of processed meat consumption (Gnagnarella, Caini, Maisonneuve, & Gandini, 2018).

Thompson, et al. (2018) point out that rather classifying certain foods as “good” or “bad”, the whole pattern of consumption needs to be considered. Simply eliminating or minimizing one food or food group will not correct other defects in dietary and overall health habits (Thompson, et al., 2018).

**Diabetes.** Diets that limit red and processed meats and refined sugars while increasing fruit, vegetable, legume, and whole grain intakes reduce the risk and complications associated with type 2 diabetes (Chen, et al., 2018; Colditz, et al., 2016;
Locke, et al., 2018; Misra, Balagopal, Raj, & Patel, 2018; Orlich, et al., 2019; Qian, Liu, Hu, Bhupathiraju, & Sun, 2019; Salas-Salvado, Becerra-Tomas, Papandreou, & Bullo, 2019; Satija, et al., 2016; Springman, et al., 2016). Heme iron and it’s resulting systemic inflammation have been implicated as causes, although the biophysical mechanisms by which red meat promotes Type 2 diabetes is still unknown (Misra, et al., 2018; Salas-Salvado, et al., 2019). In a longitudinal study of 200,000 American health professionals studied for over 20 years, diets that contained limited animal products and emphasized plant foods were correlated with a 20% reduced risk of diabetes (Satija, et al., 2016). Chen, et al. (2018) found a linear relationship with animal-based diets and diabetes risk. Plant-based diets that reduced processed foods and eliminated animal products were correlated with a 34% decrease in diabetes risk, while those with plant-based diets high in processed foods demonstrated a 15% increase in diabetes risk (Satija, et al., 2016). Qian, et al. (2019) also found that plant-based diets that focused on unprocessed foods furthered the decrease in diabetes risk. The effects of processed meat intake on diabetes were echoed in another meta-analysis by Bellou, Belbais, Tzoulaki, and Evangelou (2018).

In a systematic review conducted by Kouvari, Notara, Kalogeropoulos, and Panagiotakos (2016) four meta-analyses and ten prospective studies examined the role of processed and unprocessed meats in diabetes prevention. Every study examined demonstrated that processed meats exacerbate the incidence of diabetes (Kouvari, et al., 2016). Half of the studies examined showed significant increases in diabetes incidence with unprocessed meat intake, with no differentiation between red meat and
poultry (Kouvari, et al., 2016). When combined with healthy weight maintenance, regular physical activity, and non-smoking status, a healthy diet of low meat consumption and high intake of vegetables and fruits reduces the risk of diabetes by 93% (Fardet & Rock, 2014). Feskens, Sluijk, and Van Woudenbergh (2013) found increased incidence of diabetes in those who consumed red meat and stronger evidence in the links between diabetes and processed meat. Heme iron, trans fatty acids, sodium, and dietary cholesterol found in red and processed meat have all been associated with increased microvascular complications (Feskens, et al. 2013; Salas-Salvado, et al., 2019). A study in China noted that processed meat intake was responsible for 2.8 million diabetes cases, while red meat was responsible for 1.8 million cases (Li, et al., 2017). For perspective, 0.5 million cases of diabetes were attributed to sugar-sweetened beverage intake (Li, et al., 2017). Misra et al. (2018) found that any consumption of red meat increases the risk of developing Type 2 diabetes.

An American study compared red meat cessation to a fiber-increase group to a control group and found that those who eliminated red meat from their diets decreased insulin resistance while increasing endogenous insulin secretion significantly (Willmann, et al., 2019). All three groups showed weight loss and improvements in glucose tolerance that were equivalent, but the group that eliminated red meat had a significant drop in ferritin levels, which correlates with work done by Feskens, et al., (2013) and Salas-Salvado, et al., (2019).

Mari-Sanchis, et al., (2018) discovered a direct association between gestational diabetes and consumption of meat. In evaluating red and processed meats, the risk of
developing gestational diabetes was doubled with high intakes of both (Mari-Sanchis, et al., 2018). Heme iron is a risk factor for gestational diabetes, but the impact of heme iron lacked the statistical significance of red and processed meats on the outcomes (Mari-Sanchis, et al., 2018).

**Cardiovascular disease.** Cardiovascular disease is the leading cause of mortality in America and in 2008 cost nearly $300 billion in health care expenditures (Centers for Disease Control and Prevention, 2017; Smith, 2016). Dietary factors are the single largest predictor of cardiovascular disease (CVD) risk (Jardim, et al., 2019; Smith, 2016; Yakoob, et al., 2016; Yu, et al., 2016). In 2012, an estimated 45.4% of cardiometabolic mortality can be attributed to diet, with annual diet-related costs of $301 per person (Jardim, et al., 2019; Micha, et al., 2017). Yakoob, et al., (2016) found that suboptimal diets were responsible for over 53% of cardiometabolic deaths, surpassing hypertension as a risk factor for cardiac disease. Trans fatty acid levels predicted the risk of CVD independently of other dietary factors and red meat indicated increased risk of CVD significantly compared to other protein sources (Wang, et al., 2016; Yu, et al., 2016). Excess phosphate accumulation in the bloodstream from red and processed meat catalyzes cardiovascular and cellular damage, inducing CVD through multiple pathways (Erem & Razzaque, 2018). Replacing red meat with equivalent calories from whole grains induced a reduction in CVD risk in one study (Yu, et al., 2016). Smith (2016) evaluated several studies linking blood vessel health with reduced meat intakes or vegetarian diets and found that those who omitted meat entirely had better vascular outcomes than those with reduced meat intakes. Reduced meat intake populations did
achieve improved cardiac health compared to those with unlimited meat intakes (Orlich, et al., 2019; Smith, 2016; Yakoob, et al., 2016). Patients with moderate to severe heart disease achieved a 91% remission in angina symptoms after changing their diets to plant-based, with a 72% symptom reduction after five years (Smith, 2016). Within the care-as-usual group there was a 186% increase in angina symptoms at the end of the first year and a 36% decrease in symptoms after five years (Smith, 2016). In the same study, the rate of cardiac events in the plant-based group was half of that of the care-as-usual group (Smith, 2016). Plant-based patients were also able to significantly increase their exercise capacity over their omnivorous peers, further reducing their risk for cardiovascular events (Smith, 2016). Each 50 gram serving of processed meat is thought to increase cardiovascular mortality by 18% to 24% (Abete, Romaguera, Vierira, Lopez de Munain, & Norat, 2014; Dinu, et al., 2017). N-nitroso compound and other elements found in processed meat have been described as risk factors in heart failure (Cui, et al., 2019).

Each 100 grams of total meat (one serving) has been found to increase the risk of stroke 10%, with red meat increasing the risk by 13% (Chen, et al., 2013) Processed meat increases the risk by 11% for each additional 50 grams per day (Chen, et al., 2013). Two slices of bacon equal roughly 50 grams. Bellavia, et al. (2016) found a 29% increase in risk of CVD when comparing those with the highest intakes of red meat to those with the lowest intakes. These findings were regardless of fruit and vegetable intakes and also reflected a 21% decrease in all-cause mortality among the the lowest quintile of meat consumption (Bellavia, et al., 2016).
Another meta-analysis by Altobelli, Angeletti, Rapacchietta, and Petrocelli (2019) found that red meat significantly increased the risk of stroke, but white meat and cheese appeared cardioprotective. Where other studies have found nuts and legumes to be cardioprotective, this was not the case in the meta-analysis by Altobelli, et al., (2019).

Another study among older immigrants from south Asia expressed that although vegetarianism alone in this population is not cardioprotective, the consumption of plant proteins, such as nuts and legumes do decrease cardiovascular risk (Jin, Talegawkar, Kanaya, Kandula, & Rodriguez, 2018). Acculturation to highly processed foods, including refined grains and sugar-sweetened beverages seems to be the cause for this unique finding (Jin, et al., 2018).

Benetar & Stewart (2018) found similar results in their systematic review, but noted that vegan diets were inversely linked with a variety of cardiometabolic factors that promoted CVD. Factors such as BMI, waist circumference, insulin resistance, cholesterol levels, and blood pressure were all reduced in the vegan group (Benetar & Stewart, 2018). These researchers further hypothesised that those who follow a vegan diet are more likely to adhere to other health-promoting behaviors, such as regular exercise and smoking cessation (Benetar & Stewart, 2018). However, it is highly likely that symptom cessation and a healthy lifestyle management program will lead to the changes necessary to prevent and possibly reverse cardiovascular disease (Erem & Razzaque, 2018; Smith, 2016; Whalen, et al., 2017).
Kidney disease. Chronic kidney disease (CKD) affects nearly 15% of the population in the United States and most of these cases are largely preventable with a diet of reduced meat and increased fruit and vegetable intake (Kramer, 2019). Red and processed meats have been linked to the formation of kidney stones, decreased overall kidney function, and metabolic dysregulation (Kramer, 2019; Mitch & Remuzzi, 2016; Rysz, Franczyk, Ciałkowska-Rysz, & Gluba-Brzozka, 2017). The catabolism of animal proteins is the primary source of acid formation, which are processed by the hormones Angiotensin II, aldosterone, and endothelin (Mitch & Remuzzi, 2016). These hormones, when present in high levels will worsen kidney function over time (Mitch & Remuzzi, 2016). The intake of animal proteins trigger humoral and local mediators, causing vasodilation of the afferent arterioles, prohibiting autoregulation of blood flow through the glomeruli, leading to hemodynamic injury of the nephrons (Kramer, 2019). The Tehran Lipid and Glucose Study followed 1630 participants who were initially free of chronic kidney disease (Asghari, Momenan, Yuzbashian, Mirmiran, & Azizi, 2018). The participants of this study who consumed a high fat, high sugar dietary pattern increased the odds of developing CKD by 46%. The lacto-vegetarian group decreased the odds of CKD by 43% (Asghari, et al., 2018). A strict vegetarian diet has been shown to impact acidosis and blood pressure, reducing the impact of both on kidney disease (Rysz, et al., 2017). For patients with more advanced kidney disease, phosphorous needs decline readily, which can be allayed by a diet rich in fruits and vegetables, while limiting processed foods and meats of all kinds (Rysz, et al., 2017).
Other health impacts of red and processed meat. Consumption of red and processed meats have been linked with obesity, metabolic syndrome, multiple sclerosis, hypercholesterolemia, declines in neural function, fatty liver disease, age-related macular degeneration, increased severity of psoriasis, atopic dermatitis, age-related cognitive decline, mental illness, and increased overall mortality (Budhathoki, et al., 2019; Chapman, et al., 2019; Colditz, et al., 2016; Esposito, Bonavita, Sparaco, Gallo, & Tedeschi, 2018; Opie, O'Neil, Jacka, Pizzinga, & Itsiopoulos, 2017; Orlich, et al., 2019; Park, Choi, & Bae, 2016; Parletta, et al., 2019; Rajaram, Jones, & Lee, 2019; Zuccotti, et al., 2018). In a Japanese study evaluating protein’s effects on mortality, the researchers found that when plant protein was partially substituted for red meat protein, the risk for cancer, cardiovascular, and all-cause mortality was significantly diminished, despite the isocaloric nature of the study (Budhathoki, et al., 2019).

Summary of Literature

Nutrition education often widens the health disparities, but when the education is culturally sensitive, relevant, personalized, and targets vulnerable populations, such education can improve the health status of those at risk for nutrition-related complications (An, et al., 2019; Baker, et al., 2014; Ball, et al., 2016; Barnidge, et al., 2015; Bazerghi, et al., 2016; Bull, et al., 2018; Caspi, et al., 2019; Clarke, et al., 2011; Shanks, 2016). When the target of the education is specific and the approaches used are multi-modal, interventions are more effective than those that use a single or double approach attempting to reach a vague target (Barnidge, et al., 2015; Clarke, et al., 2011; Gaines & Turner, 2009; Gittelsohn, Rowan, & Gadhoke, 2012).
The most effective methods to increase the nutrition status of a low income population involve increasing nutrition knowledge, changing nutrition policies within governments, retail outlets, and food pantries, and improving marketing strategies that target healthy food options (Adam & Jensen, 2016; An, et al., 2019; Appleton, et al., 2016; Ball, et al., 2016; Barnidge, et al., 2015; Caspi, et al., 2019; Clarke, et al., 2011; Dave, et al., 2017; Islami, et al., 2018; Kleemann, et al., 2008; Liberato, et al., 2014; McGill, et al., 2016; Mousa & Freeland-Graves, 2019; Ogawa, et al., 2011; Wetherill, et al., 2019; Wilson, et al., 2017). Nutrition education should be culturally sensitive, specific, time-sensitive, multi-modal, involve the entire family, include participatory components, and provide opportunities for enduring learning (An, et al., 2019; Appleton, et al., 2016; Baker, et al., 2014; Ball, et al., 2016; Barnidge, et al., 2015; Clarke, et al., 2011; Dave, et al., 2017; Derrickson, et al., 2003; Gaines & Turner, 2009; Gittelsohn, et al., 2012; Gustafson, et al., 2018; Islami, et al., 2018). Dave et al. (2017) reports that most low-income people verbalize a desire to eat healthier, but other researchers found low participation rates in their voluntary studies (Ball, et al., 2016; Barnidge, et al., 2015; Clarke, et al., 2011; Derrickson, et al., 2003). Despite the low participation rates reported in most studies, significant changes are noted and health improvement is possible (Appleton, et al., 2016; Barnidge, et al., 2015; Clarke, et al., 2011).

To make a specific nutrition change in this population, the single most meaningful change should be targeted (Barnidge, et al., 2015). Because Americans generally consume double the amount of protein needed in the diet and tend to believe
that animal protein is a necessary component of a healthy diet, reducing the protein sources known to be harmful is a logical first step (Kramer, 2019). Providing education about vegetarian protein sources, which are readily available to food pantry consumers, will theoretically encourage consumers to use the foods they have in creative ways.

**Theoretical Framework**

Utilizing the Iowa Model as a conceptual framework, the proposed scholarly project hoped to examine the behavioral effects involving household nutrition following a written nutrition education resource pack to consumers who use the local food bank. The Iowa Model was selected due to its simplicity and its applicability to most research involving evidence-based practice implementation (Cullen, et al., 2018). A visual depiction of the Iowa Model framework can be found in Appendix C (Titler, et al., 2002). Within the Iowa Model, the triggering issues were first explored (Cullen, et al., 2018). Improving the nutritional status of at-risk populations was the triggering issue for this project.

Secondly, an actionable question was developed using the PICOT format, wherein P = population, I = intervention, C = comparison, O = outcome, and T = time (Cullen, et al., 2018). Consumers who utilize the food pantry made up the population for this study. The intervention investigated is a nutrition education and recipe resource pack. Because there were not two distinct groups involved to compare, the comparison component was not used. Intakes of various protein sources of the participants would have been evaluated before and after the intervention, with the change in the intakes of red and processed meats and alternative protein sources as the outcomes. At least two
food bank visits for each participant would have been the time allotted for the intervention.

The next step in the Iowa Model was to prioritize topics according to feasibility, needs, and plans (Cullen, et al., 2018). Prioritizing the project involved assessing if this was a knee-jerk reaction to a critical event, a systems problem, or something that would have needed support and buy-in (Cullen, et al., 2018). Attaining buy-in from agencies to assist in the scholarly project was critical to development and implementation. Topics that involved sweeping governmental policy changes were well outside the scope of a capstone project, therefore the priority for this project was time and availability. Existing research on nutrition interventions within food pantries indicated that long-term studies are needed. Because the capstone format requires a finite time frame of 30-60 days, this would not be possible. Likewise, structural changes and procurement policies would not be possible to implement. The capstone team collaborated with the food pantry management staff to assess needs, plans, and feasibility of the proposed project.

Development of a team to implement and evaluate the project was the next step in the Iowa Model (Cullen, et al., 2018). For this project, the team consisted of the capstone authors, a consulting statistician, and the food pantry manager. Although team development occurs after topic prioritization in the Iowa Model, this needed to be reversed to allow meaningful collaboration among team members.

Available evidence was then assembled, appraised, synthesized, and evaluated (Cullen, et al., 2018). A thorough search and examination of existing literature
regarding the nutrition status of food pantry recipients and potential interventions to improve that status was required to discern gaps in the research and which interventions would most likely have been effective. Literature for this project was gathered through online databases and systematically appraised (Appendix A). The literature was categorically synthesized and evaluated for applicability, reliability, and validity. Sufficient research supported the pilot project of providing nutrition education to food pantry clients.

The next step in the Iowa Model was to implement the project into practice (Cullen, et al., 2018). Due to SARS-CoV-2 pandemic mitigation guidelines, implementation of this project was cancelled. Had implementation happened, nutrition education posters would have been prominently displayed within the food pantry lobby and a sample serving of a plant-based chili would have been offered to each patron as he/she entered the facility. Eligible patrons would have been offered the opportunity to participate in the capstone project and informed consent would have been obtained from those who elected to participate. The primary investigator would have been available to answer questions about the consent form and the capstone project itself. Candidates who consented to participate in the project in writing would have been queried about their typical protein eating habits prior to any intervention through a food frequency questionnaire developed by the primary investigator. Each food pantry patron would have had the opportunity to sample a plant-based chili and receive their groceries with a resource pack outlining protein nutrition information and containing different high protein recipes that eliminate red and processed meats. As the
participants returned to the food pantry on subsequent visits, they would have again been queried about meat and protein eating habits using the same questionnaire.

Results would have been evaluated at the end of the project to determine if the resource packs made an impact on the nutrition habits of the consumers queried. If significant positive changes were made in protein intakes after the intervention, the next step, although not part of this project, would have been to fully integrate the intervention into the pantry environment, addressing other healthy foods and making small changes as needed to fine-tune the process.

Dissemination of the project findings was the final step in the Iowa Model (Cullen, et al., 2018). The findings of this project would have been shared with the food pantry director and the faculty and students at Nebraska Methodist College’s annual research day. Without results, the posters and resource packs can still be shared with the food pantry for possible future use and the project itself will be disseminated through Nebraska Methodist College’s virtual experience. The interventions and tools used for the proposed project could be considered for implementation in other environments or combined with other interventions. Through idea sharing, professionals can improve their practices (Cullen, et al., 2018). The Iowa Model presented a systemic method for creating evidence-based practice out of research findings (Cullen, et al., 2018).

Organizational Assessment

The food pantry for which this project was intended is a small, non-mobile, non-client-choice food bank in the Midwest. The pantry had previously partnered with the
county extension office to implement some changes, such as a community garden. However, the pantry was not sizable enough to become a client-choice pantry and the staff was quite small. The pantry director was very willing to allow the capstone project to be done, especially if the materials provided would improve the lives of the clients served by the pantry (M. Nelson, personal communication, October 2019). Targeting a vulnerable population to improve nutrition and reduce health disparities would likely be most effective in a food pantry environment (McGill, et al., 2016).

This scholarly project was well suited for a small food pantry, as the operating hours allowed for individuals to pick up their food one-by-one, rather than arriving in a large group as other local food pantries operate. This would have allowed for more time for clients to complete the questionnaires about their eating habits before and after the intervention. A potential barrier may have been low participation rates, as seen in previous studies of food pantry clients. If clients elected not to participate in the pre-intervention and post-intervention, much data could have been lost.

The primary barrier that prohibited implementation was the social distancing guidelines caused by the SARS-CoV-2 pandemic that affected the traffic flow within the food pantry setting and societal guidelines for social distancing and prevention of contact with potentially contaminated objects (Centers for Disease Control and Prevention, 2020). Obtaining consent using paper and pen or a tablet computer would have been high-risk activities within the SARS-CoV-2 pandemic setting.

**Methodology**

This scholarly project would have been a process improvement pilot project that
involved measuring the self-reported intakes of various protein sources for food pantry clients before the intervention and after the intervention. Posters hung prominently within the food pantry and samples of plant-based chili would have been offered to potential participants as they entered the pantry. A food frequency questionnaire would have been utilized to determine a baseline nutritional status for each participant. Clients would have then been provided with a resource pack containing healthy, high protein recipes and information about various protein foods and healthy eating on a budget. Food pantry clients who completed an initial questionnaire would have been asked the same questions within two food pantry visits. The questionnaire results would have been compared with the initial results to determine if the education provided decreased the intakes of red and processed meats and/or increased the intake of poultry, seafood, eggs, and plant-based proteins of the clients served.

**Setting**

This scholarly project would have occurred in the setting of a small suburban midwestern food pantry that serves roughly 125 clients monthly. Clients of this food pantry are typically white or Vietnamese, with few other races. About two thirds of the clients have children and of those that do not, most are elderly females. Clients usually drive to this pantry, as it is not located within a large residential community. The pantry provides very limited fresh produce, dairy or meat/seafood products, but does provide clients with vouchers for these to use at local grocers. Clients are typically provided with canned or dried beans, cereal, canned fruits and vegetables, and meal mixes such as tuna or beef casserole mixes, macaroni and cheese mix, and/or pancake mix. Fresh
produce is usually available on an inconsistent basis.

**Sampling**

Participants for this scholarly project would have been adults over age 19 who use a small suburban food pantry in the Midwest. Children and non-English speakers would have been excluded, as language support was not readily available. Because food pantry users are likely to be food insecure and of lower socioeconomic status, this population was of interest. As the setting was intended to be in the food pantry, the patrons of this food pantry were the logical population.

**Implementation Procedures**

The implementation of this project was cancelled due to SARS-CoV-2 pandemic mitigation guidelines. Had it been implemented, the Primary Investigator would have collaborated with the food pantry manager to be at the food pantry on the days of collection. Recruitment would have been initiated as adult patrons entered the pantry and were greeted by the primary investigator. Educational posters would have been displayed within the food pantry during the project. A sample of plant-based chili would have also been available to food pantry patrons. This was to be kept in a slow-cooker and ladled into small serving cups by the pantry manager and/or the primary investigator. Patrons would have been able to choose to accept the sample of food regardless of study participation. The nature of the project would have been explained to the potential participants and questions the participants may have would have been answered prior to obtaining consent. The primary investigator would have asked patrons to complete an informed consent disclosure. The consent form was to be
attached to a clipboard and handed to patrons with a pen to sign. After informed consent was obtained, the respondents would have either completed or had assistance to complete the food frequency questionnaire instrument. Each participant would have been asked to use a code containing the month and date of their birth with the last three digits of their phone numbers. This code was to allow questionnaires to be paired and help maintain anonymity of the participants. Food pantry patrons would have had the opportunity to taste a prepared plant-based chili as they received their groceries with a resource pack outlining protein nutrition information and containing different high protein recipes that eliminate red or processed meats. Posters encouraging healthy protein sources were to be displayed within the pantry. The primary investigator would have been available to answer questions and verbally ask each participant to read through the resource packs prior to their next pantry visit. The Primary Investigator, who had undergone CITI training, would have been present at the pantry site at least twice weekly for three consecutive weeks to recruit participants, answer questions, and collect questionnaires. Patrons who completed an initial questionnaire would have been queried again using the same instrument on subsequent pantry visits. Participants would have been asked to complete all questionnaires confidentially, using only their predetermined code as identification. If participants were unable to complete the questionnaire without assistance, staff assistance would have been provided as able and necessary.

**Ethical Considerations/Protection of Human Subjects**
Institutional Review Board (IRB) approval would have been required prior to initiating the capstone project. The Primary Investigator and faculty mentor have completed the Human Subjects Research – Social Behavioral-Educational-Basic course through the Collaborative Institutional Training Initiative (CITI) program. Risks to the population would have included confidentiality breaches, disclosure of literacy barriers, and time consumption. Benefits to the population who completed the intervention may have included enhanced nutrition knowledge, increased self-sufficiency in meal planning, and improved health outcomes. To prevent confidentiality breaches, questionnaires would have been identified using only the code provided by each respondent. The Consent to Participate in Capstone Project form would have been explained by the Primary Investigator to each potential respondent and respondents would have been encouraged to read through the consent form before signing. Respondents would have had the ability to opt out of the questionnaire at any time. Questionnaire data would have been collected in a manila envelope and sealed at the end of the day by the primary investigator. The sealed envelopes would have been transported to the primary investigator’s home office, then transferred to a password-protected Excel spreadsheet daily. Original questionnaires were to be kept in a locked file cabinet in the primary investigators locked home office until the end of the project, then shredded using a cross-cut paper shredder. Electronic data would have been kept in a password protected Excel file in a password protected computer. The primary investigator would have been the only person with access to the original questionnaires.
and electronic data. The primary investigator had no known relationship with any of the potential participants.

**Data Analysis & Results**

Since the project was not implemented, no data was collected. This decision was made due to the SARS-CoV-2 pandemic that caused the cessation of non-essential services and a national recommendation to socially distance at a minimum of six feet between people. At the time of intended implementation, thirty-three confirmed cases of SARS-CoV-2 were present within the local area according to the county health department. Gatherings of more than ten persons were forbidden and serving of food and beverages was allowed on a “take-out” basis only within the area during the planned dates of the intervention. To comply with regional guidelines, the intervention was not implemented, thus protecting potential participants from inadvertent exposure to a potentially deadly virus.

**Discussion**

This project sought to reduce the intake of red and processed meats by increasing nutrition knowledge and skill among the most food insecure populations. The threat of the SARS-CoV-2 pandemic may have endangered the health of members of a population that is already facing comorbid health conditions, poverty, and a weakened support system. The rapid increase in unemployment and local food shortages further increased the psychological risk to the population to be studied (KETV Staff Report, 2020b; Scripps Media, Inc., 2020). Although there was no true shortage of food, a combination of factors led to scarcity in the local grocery stores. Local schools
were released early and relatively unexpectedly while non-essential employees were
either assigned to telework or furloughed, if not laid off (Columbus, 2020). This
combination led to some localized food hoarding, panic buying, and depleted grocery
shelves in an area where restaurants, corporate cafeterias, and schools that usually
supply food were no longer poised to do so (Columbus, 2020).

Changes had already been implemented within food pantries in the local area by
forbidding client-choice and dealing with unexpected surges due to the economic
impact of the SARS-CoV-2 pandemic (KETV Staff Report, 2020a). Increased food
insecurity had become a sudden and national problem with a nearly tenfold increase in
need and steep decline in donations (KETV Staff Report, 2020a; NBC News, 2020).
Decreasing amounts of volunteer help coupled with the need to socially distance
created further strain, as many of the volunteers were at-risk for disease complications
themselves (NBC News, 2020). Because furloughed employees were seeking food
assistance for the first time, additional help was needed to assist in navigating a rapidly-
changing system (NBC News, 2020). Sharply rising unemployment coupled with the
burden on state governments had caused previously employed populations to scramble
to obtain unemployment benefits (KETV Staff Report, 2020b; C. Stoner, Federal Wage
and Hour Investigator, personal communication; April 5, 2020).

Due to exponentially increased need, staffing shortages, food shortages, and
necessary procedural changes within the food pantry, the planned intervention needed
to be cancelled. Social distancing guidelines of remaining six feet apart and ceasing all
non-essential contact recommended by the World Health Organization and the Centers
for Disease Control and Prevention further complicated the matter, making implementation impossible (Centers for Disease Control and Prevention, 2020; World Health Organization, 2020). As the dangers of disease transmission are more prevalent in persons with comorbid conditions, those facing food insecurity are at heightened health risk from potential person-to-person or object-to-person contamination (CDC, 2020; WHO, 2020). Protecting the vulnerable populations was a priority over any educational endeavor.

Within the Iowa Model theoretical framework, creating awareness and interest in the project is a necessary element prior to implementation (Cullen, et al., 2018). While the food pantry management was initially enthusiastic about this project, that enthusiasm quickly waned as SARS-CoV-2 pandemic conditions became evident (M. Nelson, personal communication, April 2, 2020). Furthermore, the target population evolved from a predominantly stable, chronically food insecure population to a population in crisis. Enthusiasm for nutrition education was replaced with uncertainty about food availability and fear of infectious disease. The breakdown in project interest due to the SARS-CoV-2 pandemic, the population changes, and the stresses under which the setting was operating became insurmountable obstacles to implementation.

**Plan for Sustainability**

The project intervention could easily be piloted in the future by the intended organization or other food pantries/social service agencies. Studies show that multi-modal interventions with smaller behavior targets are effective at nutrition education and behavior change. One concern expressed by the pantry manager is that patrons
often do not use the food they are given (M. Nelson, personal communication, November 2019). She felt that the planned intervention would help reduce waste as well as teach valuable kitchen and sustainability skills for patrons (M. Nelson, personal communication, November 2019). Using specific printed materials from the Food Hero program would provide needed flexibility within the resource packs when unplanned surges of fresh produce occur. Such surges in the past have included sealed packages of cabbages from an overturned truck, fresh produce when a larger food bank’s refrigeration unit failed, and a bumper crop of kohlrabi from the community garden (M. Nelson, personal communication, November 2019).

As stores gradually open and pantries are able to allow patrons to choose their own foods, pantry design may be modified to promote healthier foods and sampling may be allowed again. The resource packs are easily modifiable to meet the unique needs of the pantry and their patrons, but are simple enough to use as a stand-alone intervention. Educational webcasting could be another possible means of disseminating nutrition information and resources to the food insecure. Some sites have used databases that tag recipes by ingredients and cooking tools (ie: blenders, crock pots, cooktops). This could be another resource to add to either a designated web site or printed on-site (Clarke, Evans, & Hovy, 2011). Resource packs could also be used in cooking education programs within the public schools. Landers (2003) challenged culinary students to develop nutritious, easy, and creative recipes that relied heavily on commodity foods. By presenting this as a cooking competition, new flavorful recipes could be added to the resource packs and targeted to foods that pantry patrons would
appreciate. After the pandemic situation resolves, this project could not only be easily implemented, but could be expanded and improved.

**Implications for Practice**

Placing additional burdens on an already taxed organization in a stressful situation with a population surge and decreased supply would have been neither ethical nor practical. As priorities shifted to meet the physical needs of the population, the educational needs needed to be sidelined. The closure of non-essential services nationwide had a massive impact physically, technologically, economically, socially, and emotionally (Atkeson, 2020). The influx of newly food insecure population would have skewed results, even if the project could have been implemented. The risks of transmission of potentially deadly SARS-CoV-2 cannot be understated. Leaders in every industry have had to shift priorities and plan for a “new normal” (Lee, 2020; Van Bavel, et al., 2020). Similarly, the faculty and administration at Nebraska Methodist College recognized the risk to the targeted population and the emotional toll this project would add and cancelled the implementation of the project. The risks outside of the SARS-CoV-2 pandemic would have been minimal. Interventions with a volatile and vulnerable group in the setting of a pandemic of this magnitude would be unethical at best and deadly at worst.

**Conclusion**

In conclusion, this project attempted to address health inequities by specifically targeting the vulnerable population of the food insecure in suburban midwest. Improving the nutritional quality of the diets consumed by the food insecure would
have theoretically improved the population health, decreasing morbidity, mortality, and health care costs. Findings could have supported increased nutrition education efforts with a broader focus in food pantry patrons and other high-risk populations. While implementation was not possible with this project, it could be expanded and placed into practice at more appropriate time. Since the SARS-CoV-2 pandemic is changing life as we know it on a daily basis, only time will tell when the event at hand has run its course (Van Bavel, et al., 2020). Until that undetermined date, nutrition education in a food pantry setting is not feasible.
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doi:10.1017/S1368980019000405


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doi:10.2105/AJPH.2016.303316


Appendix A
Literature Search Map

Articles identified through database search: “nutrition education” AND “food insecurity” or “food pantry/bank” (n 1763)

Articles identified through database search: “processed meat” or “red meat” AND “health outcomes” (n 763)

Articles screened by title and abstract (n 2526)

Articles excluded after title and abstract screening, duplicate articles removed (n 2363)

Articles screened by full text (n 163)

Articles excluded after full text review (n 66)

Articles identified through reference search (n 5)

Articles included in review (n 102)

Articles pertaining to nutrition intervention in food pantry setting (n 24)

Articles pertaining to health hazards of red and processed meat (n 78)
### Reference Matrix

**Clinical Question:**
In consumers who utilize the food bank (P), how does education about nutrient dense foods (I), affect the nutritional value of the diet (O) within two food bank visits (T)?

<table>
<thead>
<tr>
<th>Citation/Level of Evidence</th>
<th>Participant/Setting/Sample Size</th>
<th>Purpose/Background</th>
<th>Methods/Design &amp; Limitations</th>
<th>Findings/Summary/Strengths/Weakness</th>
<th>Applicability to Capstone</th>
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<td>McGill, R., Anwar, E., Orton, L., Bromley, H., Lloyd-Williams, F., O’Flaherty, M., ... Capewell, S. (2015). Are interventions to promote healthy eating equally effective for all? Systematic review of socioeconomic inequalities in impact. <em>BMC Public Health, 15</em>(1), 1–15. doi: 10.1186/s12889-015-1781-7</td>
<td>36 worldwide studies evaluated for effects of diet interventions in various social groups.</td>
<td>To determine which healthy eating interventions were equally effective in varied sections of the population (able to ameliorate social determinants of health)</td>
<td>Systematic Review of the Literature</td>
<td>Several studies focused on policies that are not feasible with PICOT. Revealed that education tailored to low income groups will likely narrow the gap in nutrition between food security statuses. Person-based interventions are not necessarily tied to improved outcomes in lower SES groups. Did not detail components of education interventions.</td>
<td>Supports place-based intervention to increase nutrition and disease burden in food-insecure households.</td>
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<td>Liberato, S. C., Bailie, R., &amp; Brimblecombe, J. (2014). Nutrition interventions at point-of-sale to encourage healthier food purchasing: a systematic review. <em>BMC Public Health, 14</em>(1), 919. doi: 10.1186/1471-2458-14-919</td>
<td>32 studies examining the effects of different interventions on the purchasing of healthier foods.</td>
<td>To determine the efficacy of point-of-sale interventions on nutritious purchases and habits.</td>
<td>Compared interventions in nutrition education, price reduction, and increased availability at point-of-sale. Some included retail outlets and vending machines. Food banks were not studied.</td>
<td>Monetary incentives were the only intervention to reliably increase the sales of nutritious foods. Studies did not include food pantries. Nutrition education alone did not consistently significantly increase sales of nutritious foods. 11 studies had high risk for bias.</td>
<td>Very limited use and does not support PICOT hypothesis.</td>
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<td>16 studies in English primarily targeting low SES, minority populations.</td>
<td>To evaluate the efficacy of interventions in increasing availability and intake of healthy foods in small grocery stores in low SES populations.</td>
<td>8 studies peer-reviewed, 8 were gray literature. 4 trials with primary goal of changing food purchasing/consumption patterns. Others has a goal to increase availability of healthy foods.</td>
<td>Meta-analysis not done. Assessment tools lacking in gray literature. Most studies did not examine purchasing patterns or consumption patterns.</td>
<td>Limited applicability due to limited studies relevant to PICOT and reviews of gray literature.</td>
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<td>Adam, A., &amp; Jensen, J. D. (2016). What is the effectiveness of obesity related interventions at retail grocery stores and supermarkets? — a systematic review. <em>BMC Public Health</em>, 16(1), 1247. doi: 10.1186/s12889-016-3985-x</td>
<td>42 studies of retail interventions comparing effectiveness of nutrition enhancement</td>
<td>To determine how retail interventions effect sales and consumption of healthy foods.</td>
<td>Systematic review of the literature 2003-2015. Peer-reviewed English language focused on healthier food purchasing. Checked by two independent reviewers.</td>
<td>Most studies reviewed high to medium bias. Three studies with information intervention alone showed increase in sales of healthful foods. Two studies with information intervention showed no increase in sales of healthful foods. Economic incentives were most effective single intervention. Multi-component policies are most effective in increasing healthy food intake.</td>
<td>Parts of this study are applicable. May need to delve into the research regarding information interventions alone.</td>
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<td>Bull, E. R., McCleary, N., Li, X., Dombrowski, S. U., Dusseldorp, E., &amp; Johnston, M. (2018). Interventions to promote healthy eating, physical activity and smoking in low-income groups: a systematic review with meta-analysis of behavior change techniques and delivery/context. <em>International Journal of Behavioral Medicine, 25</em>(6), 605–616. doi: 10.1007/s12529-018-9734-z Systematic Review, Level I</td>
<td>35 RCTs with 45 interventions, 17,000 low-income participants</td>
<td>Examined the effects of behavior change interventions among low-income participants</td>
<td>Identified which interventions are most effective and explored synergistic effects between interventions using new statistical frameworks</td>
<td>Behavioral self-monitoring was linked with most significant change in eating habits. Face-to-face meetings with subjects also linked with most significant behavior changes.</td>
<td>May help make written education more interactive to promote behavior change, but supports PICOT very weakly.</td>
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<td>Escaron, A. L., Meinen, A. M., Nitzke, S. A., &amp; Martinez-Donate, A. P. (2013). Supermarket and grocery store-based interventions to promote healthful food choices and eating practices: a systematic review. Doi: 10.5888/pcd10.120156 Systematic Review, Level I</td>
<td>58 studies examined 33 interventions from 1940 to 2012.</td>
<td>To determine efficacy of grocery store intervention on nutritious purchases and habits</td>
<td>33 interventions graded based on efficacy. 22 in the United States, 4 in Canada, 7 in other countries.</td>
<td>Studies from pre-1980 may not be relevant today. Most effective strategies were multi-modal. Most store owners desire financial incentives to change interventions.</td>
<td>Article was not very descriptive in educational interventions. This will be of limited use.</td>
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<td>Ball, K., McNaughton, S. A., Le, H. N., Abbott, G., Stephens, L. D., &amp; Crawford, D. A. (2016). ShopSmart 4 Health: results of a randomized controlled trial of a behavioral intervention promoting fruit and vegetable consumption among socioeconomically disadvantaged women. <em>The American Journal of Clinical Nutrition, 104</em>(2), 436–445. doi: 10.3945/ajcn.116.133173 RCT, Level II</td>
<td>248 economically disadvantaged Australian women</td>
<td>To determine the effects and costs of a behavior change intervention for increasing fruit and veggie purchase and consumption among socioeconomically disadvantaged groups.</td>
<td>Retrospective baseline data x 3 mo., then 6 mo. Intervention period and follow up at 6 mo. Thereafter. Randomly assigned to control and intervention groups.</td>
<td>0.5 serving increase in vegetable intake in intervention group. Interventions focused on behavioral interventions, goal setting, small-groups and printed materials.</td>
<td>Supports some written education to increase nutrient density. PICOT will not involve MI or face-to-face interventions.</td>
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<td>Ogawa, Y., Tanabe, N., Honda, A., Seki, N., Suzuki, T., &amp; Suzuki, H. (2011). Point-of-purchase health information encourages customers to purchase vegetables: objective analysis by using a point-of-sales system. Environmental Health and Preventative Medicine 16(239) doi: 10.1007/s12199-010-0192-8</td>
<td>Two grocery stores in Japan (one intervention, one control). Sales of fruits and vegetables compared during and after point of sale intervention.</td>
<td>To determine the efficacy of point-of-sale health information in increasing the sales of vegetables.</td>
<td>Non-randomized controlled trial (cohort study), Level III</td>
<td>This study only examined purchase of vegetables, not consumption, knowledge, or attitudes. Would Japanese results translate into American results? Would purchase of healthful foods translate into consumption of same?</td>
<td>PICOT will examine point-of-sale nutrition intervention, but not within context of a full grocery store. Sales will not be factored into PICOT.</td>
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<td>One New York state food pantry serving ~ 150 clients per session.</td>
<td>To determine the effect of product placement and packaging on pantry choices</td>
<td>At each weekly food pantry session, products were altered in placement or packaging. The amount of the products featured were measured at the end of each session.</td>
<td>Clients preferred products placed in front of pickup line and those with original packaging, suggesting that removing cognitive barriers may help with product selection and that maintaining original packaging may decrease the stigma of using a food pantry.</td>
<td>Environmental research that did not include education component. Limited applicability.</td>
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<td>Self-selected groups within 5 food banks in California. 111-131 clients at each food bank.</td>
<td>To determine if a tailored education/recipe booklet would increase vegetable intake of food bank clients, compared to a generic education/recipe booklet or no booklet.</td>
<td>Participants could opt out and those without homes or phones could not be included. 63% of clients participated in the study.</td>
<td>Custom tailored booklets positively impacted vegetable intake. Cost was $1.30/booklet. 80% of eligible families wanted the tailored booklet, compared with 60% who wanted the generic booklet.</td>
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<td>Caspi, C. E., Canterbury, M., Carlson, S., Bain, J., Bohen, L., Grannon, K., ... Kottke, T. (2019). A behavioural economics approach to improving healthy food selection among food pantry clients. Public Health Nutrition, 22(12), 2303–2313. 10.1017/S1368980019000405</td>
<td>70 clients visiting four Minnesota food pantries</td>
<td>To determine the effect of a behavioral economics approach on the quality of foods available and the foods selected by the adults visiting the pantries</td>
<td>Client surveys and client cart inventories, environmental assessments of the pantries at baseline and at four months post-intervention</td>
<td>Stocking standards can increase the appeal of healthy foods. Client food choices increased in nutrient density following intervention. Food pantry design may be a more economical intervention than traditional education approaches. Because the clients used the food pantries for most of their food supply, this could improve nutrition outcomes, although this will require further testing.</td>
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<td>Gustafson, C. R., Kent, R., &amp; Prate, M. R. (2018). Retail-based healthy food point-of-decision prompts (PDPs) increase healthy food choices in a rural, low-income, minority community. <em>PLoS One</em>, 13(12), e0207792. doi:10.1371/journal.pone.0207792</td>
<td>653 grocery sales transactions analyzed for purchase behaviors after two interventions in rural, low-income South Dakota store</td>
<td>Analysis of two different methods of prompting shoppers to purchase healthier foods at the grocery store.</td>
<td>One broad in scope and another narrow intervention were conducted in a rural grocery store to assess which led to increased purchasing of healthier foods.</td>
<td>Health information is processed slower than taste information. Low income shoppers have high stress loads and will be more influenced by a narrower message about healthy foods rather than a broader message. This examined healthy foods purchased, not consumed. Population studied is primarily native American.</td>
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Pre/Post intervention, Level III
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<td>95 very low-income participants willing to learn about food safety in Hawaii</td>
<td>To determine the efficacy of a 3-hour nutrition and life skills program on the food security, nutrition, and financial status of people facing homelessness</td>
<td>Comparison of 1-hour food safety program to a 3-hour budgeting and nutrition program. Food security and financial skills surveyed.</td>
<td>Vegetable intake improved by 3.3 servings/week in intervention group. 88% of participants reported good or complete progress with nutrition goals after 30 days. Financial goals were similar in both groups, indicating self-motivation was a bigger factor than education.</td>
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<td>Mousa, T., &amp; H Freeland-Graves, J. (2019). Food security of food recipients of a food pantry and soup kitchen. <em>Public Health Nutrition, 22</em>(8), 1–10. doi: 10.1017/S1368980018003658</td>
<td>222 adults who utilized central Texas food pantries and soup kitchens</td>
<td>To determine the impact of food donations and soup kitchen meals on food security.</td>
<td>Pre/post intervention survey of diet recall. 98% of the group ineligible for SNAP, TANF, or WIC due to citizenship or felon status.</td>
<td>Smoking and chronic health conditions lessen food security. Nutrition knowledge may help prevent food insecurity. Food pantry use helps prevent and alleviate food insecurity Weakness: findings may not pertain to suburban Midwest.</td>
<td>Supports research in the benefits of nutrition education and food pantries in alleviating food insecurity—especially for those with chronic illnesses.</td>
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<td>Findings/Summary/ Strengths/Weakness</td>
<td>Applicability to Capstone</td>
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Case study, Level V | 153 Canadian women with food insecurity surveyed about food intake, nutrition, meal preparation | Most studies examine one intervention. This one examined the link between food security and food preparation practices and how both interact with nutrition status. | Canadian study using data collected 20 years ago. Small sample size. | These findings challenge the stereotypical notions that families in poverty lack the skill or motivation to cook foods from scratch, but also raise questions about the extent to which food skills can protect very-low-income families from food insecurity. No significant association between the frequency with which women consumed foods prepared from scratch and the severity of their household food insecurity. | Interesting correlate to PICOT, but not sure how this will “fit” into the research. |
<table>
<thead>
<tr>
<th>Citation/Level of Evidence</th>
<th>Participant/ Setting/ Sample Size</th>
<th>Purpose/ Background</th>
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<tr>
<td>Dave, J. M., Thompson, D. I., Svendsen-Sanchez, A., &amp; Cullen, K. W. (2017). Perspectives on Barriers to Eating Healthy Among Food Pantry Clients. <em>Health Equity</em>, 1(1), 28–34. doi: 10.1089/heq.2016.0009 Qualitative research, Level IV</td>
<td>Focus groups/interviews of food pantry clients ages 21-50 in Houston, TX</td>
<td>To explore the barriers to healthy eating among low-income food pantry clients.</td>
<td>Semi-structured interviews. No quantitative data. Provides contrast and insight into Wetherill, White, Seligman work.</td>
<td>26% reported having fruit in the home, 33% had sugar-sweetened beverages, and 42% had vegetables. Multiple constraining factors influenced food choices: obesity, chronic disease, time, transportation, lack of kitchen equipment, nutrition knowledge and skills, social support.</td>
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<td>Kleemann, S., Cunningham, C., Slattery, C. G., &amp; McEvoy, R. (2008). The Food and Health Project, a nutrition education intervention, increases fruit and vegetable awareness and intake among disadvantaged groups. <em>Proceedings of the Nutrition Society, 67</em>(OCE7). doi: 10.1017/S0029665108009579 Observational Study (Case Series), Level V</td>
<td>101 disadvantaged adult participants in Ireland</td>
<td>To determine the effects of a nutrition education program on the awareness and intake of fruits and vegetables.</td>
<td>Examined a six-week course provided by peer instructors. Surveys completed pre-and post-intervention.</td>
<td>Positive changes in awareness and intake of nutrient dense foods noted. Non-American study. Six-week peer-led education, not written education. Focus on disadvantaged population.</td>
<td>Not directly applicable to PICOT.</td>
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<td>Barnidge, E. K., Baker, E. A., Schootman, M., Motton, F., Sawicki, M., &amp; Rose, F. (2015). The effect of education plus access on perceived fruit and vegetable consumption in a rural African American community intervention. Health Education Research, 30(5), 773–785. Doi: 10.1093/her/cyv041</td>
<td>Up to 360 residents of rural Missouri</td>
<td>To determine the efficacy of a county-wide intensive nutrition education program on fruit and vegetable intake, BMI, and health outcomes on residents of rural Missouri</td>
<td>Multiple interventions simultaneously occurring, multiple confounding factors. Examined a county-wide program administered by multiple agencies.</td>
<td>Of the study group, 9% participated in all study activities, 60% did not participate in any of the education. 30% of the control group participated in at least one intervention activity.</td>
<td>Elucidating the portions relevant to PICOT will be difficult.</td>
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Appendix C
The Iowa Model

Iowa Model of Evidence-Based Practice to Promote Quality Care

- Problem Focused Triggers:
  1. Risk management data
  2. Trends or improvement data
  3. Interal/external benchmarking data
  4. Financial data
  5. Identification of clinical problem

- Knowledge Focused Triggers:
  1. Review of research or other literature
  2. National agencies or organizations standards & guidelines
  3. Philosophies of care
  4. Questions from institutional standard committees

Consider other triggers

Is the topic a priority or of the organization?

Form a team

Assemble relevant research and related literature

- Criteria and mechanisms for use in practice

- Is there a sufficient research base?

- Pilot the change in practice:
  1. Select outcome to be achieved
  2. Collect baseline data
  3. Design evidence-based practice (EBP) guidelines
  4. Implement EBP on pilot units
  5. Evaluate process and outcome
  6. Modify the practice guideline

- Base practice on other types of evidence:
  1. Data reports
  2. Expert opinion
  3. Scientific principles
  4. Theory

Conduct research

- Institute the change in practice

Monitor and analyze structure, process, and outcome data:
- Environment
  - Staff
  - Cost
  - Patient and Family

Continue to evaluate quality of care and new knowledge

Assess
Decide
Plan
Implement
Evaluate

(Titler, et al., 2002)