

EFFECTIVENESS OF THE FRESH RX PROGRAM IN  
FOOD BANK CLIENTS WITH OBESITY, DIABETES,  
AND HYPERTENSION

By

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Title of Study: EFFECTIVENESS OF THE FRESH RX PROGRAM IN FOOD BANK  
CLIENTS WITH OBESITY, DIABETES, AND HYPERTENSION

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Abstract: The purpose of this evaluation was to determine the impact of the Fresh Rx program of the Regional Food Bank of Oklahoma on clients with obesity, hypertension, and/or diabetes. In collaboration with two low income clinics, 120 food bank clients who were diagnosed with obesity, hypertension, and/or diabetes were recruited to participate in the Fresh Rx Program for 9 months. The program combined access to healthy food through free mobile markets at the clinics, nutrition and lifestyle education, and access to medical care with the goal of improving health outcomes for low-income, food-insecure populations. Responses to a five to ten minute survey, developed by the evaluators, and clinical data provided by the clinics were used to assess the effectiveness of the program. The survey was distributed three times throughout the intervention. Clinical data were collected by clinic staff monthly to measure changes in Body Mass Index (BMI), blood pressure, and hemoglobin A1c in clients.

Fresh Rx program evaluation results showed that the program assisted participants in becoming food secure, increased access to fresh fruits and vegetables, and improved participants' perceptions of their health and control over their health. Reports on overall satisfaction with the program were overwhelmingly positive. However, reported intake of fruits and vegetables and clinical measures of body weight, blood pressure, and diabetes control were not improved. About 90% of participants were overweight or obese, with a BMI of  $37.0 \pm 9.7$  at baseline. There was no significant change in BMI from October to May. The average hemoglobin A1c value of participants was 8.2%, which showed no significant change over time. Systolic and diastolic blood pressure measurements reflected a slight increase; however there were no significant changes. The average systolic blood pressure remained at about 140 mm Hg throughout the program. The Fresh Rx program combined food distribution, nutrition education, and health screenings as an effective way to positively influence the food insecurity of low-income, food-insecure individuals with chronic diseases. Potential improvements on program focus, intensity of nutrition education, and adjustments to content could improve the impact of the Fresh Rx program on clinical measures.

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## CHAPTER I

### INTRODUCTION

In 2015, 42.2 million Americans reported to be food-insecure, at some point during the year (USDA, 2016). Food insecurity is defined as a household being “uncertain of having, or unable to acquire enough food to meet the needs of all of their family members because they had insufficient money or other resources for food” (USDA, 2015). For these individuals finding their next meal may mean depending on a charitable food program like a food bank. Food banks are private charitable food agencies that provide food to low-income, food-insecure individuals. The main role of food banks is to provide emergency food assistance, but with the growing rate of food insecurity there is a greater dependency for them to provide comprehensive food provision for extended amounts of time.

As use of food banks increase, scrutiny of the quality of the food they provide to their low-income clients has also increased. This is due to research reflecting a link between low-income populations and increased prevalence of obesity and diet related diseases (Seligman, 2010). Low-income, food-insecure individuals have poor quality diets, including those receiving charitable food donations (Rose et al., 1997; Basiotis et al., 2003; Leung et al., 2012). Studies have shown that a diet with poor nutritional quality is directly related to the increased risk of many diet-related diseases (McCullough et al., 2002). Conversely, a diet with high nutritional quality can help alleviate, prevent, or manage certain diet-related diseases, such as obesity, diabetes, and

hypertension (Hung et al., 2004, Van Duyn et al., 2000; He et al., 2004). This connection presents a unique responsibility for food banks. Not only do they need to provide food, but the nutritional quality of the food they provide is now a very significant factor in helping those with increased risk for diet-related diseases due to the high risk clients they serve.

The low-income, food-insecure population faces many barriers to obtaining a healthy diet, resulting in the adverse health outcomes and inability to manage their diet related diseases.

Overall, cost has been reported consistently as the largest barrier to obtaining a healthy diet (Haynes-Maslow, 2013; Dammann et al., 2009; Hoisington et al., 2002). With limited incomes the quality of food is usually surpassed by the necessity for a larger quantity of food (Hoisington et al., 2002). This results in unhealthy diet choices and related health disparities. Other major barriers faced by low-income, food-insecure individuals are lack of access, transportation, knowledge, attitudes, and perceptions of obtaining a healthy diet (Haynes-Maslow, 2013; Dammann et al., 2009; Hoisington et al., 2002; Cade et al., 1999).

Presented with the obvious need for increasing healthy food options for their clients, food banks also face multiple barriers to implementing these changes into the system (Campbell et al., 2011; Handforth et al., 2013). The cost of providing healthy foods to their clients is presented as a major concern for food bank directors and staff, along with vendor relationships, storage, distribution, and conflicting beliefs. Food banks are working on increasing their availability of healthy food options while overcoming these barriers to implementation.

The Regional Food Bank of Oklahoma is overcoming these barriers and taking on the task of managing diet related diseases in the low-income, food-insecure population. The Regional Food Bank of Oklahoma increased the availability of nutritious food through the Fresh Rx program. By increasing access to fresh produce and other healthy food options, the Fresh Rx program assisted their clients who suffered from obesity, hypertension and/or diabetes. To address all of the factors

that contributed to behavior change, such as a healthy diet change, the Fresh Rx program also offered education, directed clinical care, and wellness resources. The goal of the program was to make lifelong behavioral change in order for the clients to improve their health outcomes.

This research was done to evaluate the Fresh Rx program, of the Regional Food Bank of Oklahoma, to determine the impact it had on its clients with diabetes, hypertension, and obesity.

The research questions were:

- Did food insecurity change as a result of the program?
- Does the Fresh Rx program increase accessibility to nutritious food?
- Do clients' health outcomes (BMI, weight, HbA1c levels, blood pressure) improve after participation in the Fresh Rx program?
- Are clients satisfied with the Fresh Rx program?

## CHAPTER II

### REVIEW OF LITERATURE

To our knowledge there is only one published evaluation of a Food Bank program similar to the Fresh Rx program (Seligman et al., 2015). The literature review was extended to include literature which focuses on the relationships between diet and health disparities in low-income populations, who were the primary participants in government food assistance programs. It will also include a summary of interventions in similar populations that focus on diet quality to address the specific health outcomes of diabetes, hypertension, and obesity.

As of 2015, the Centers for Disease Control and Prevention (CDC) reported that 78.6 million American adults were considered to be obese (ADA, 2016). A reported 29.1 million Americans suffer from diabetes, with an additional 86 million adults considered to be pre-diabetic (ADA, 2016). Diabetes was ranked 7th in the leading causes of death in American adults (NVSS, 2013). One out of three American adults has hypertension, which is the thirteenth leading cause of death in this group (NVSS, 2013). Oklahoma was classified as having a high prevalence of all three diseases, compared to other states in America. Oklahoma is ranked 6th in obesity, 7th in diabetes, and 9th in hypertension incidence in the United States (Borger et al., 2015). In Oklahoma County 28.7% of adults are obese, and 9.9% have diabetes (Han, 2012). Comparable rates of obesity, diabetes, and hypertension were found in the population the Regional Food Bank of Oklahoma

serves. Data from the Hunger in America 2015 report indicates that 33% of the Oklahoma food bank clients have diabetes and 57% report high blood pressure (Regional Food Bank of Oklahoma, 2014). These high rates of obesity, hypertension and diabetes make the clients of the Regional Food Bank in Oklahoma in Oklahoma County an optimal population for a targeted intervention.

With 24% of Oklahomans suffering from food-insecurity the Regional Food Bank of Oklahoma serves a large community, by providing enough food to feed more than 116,000 people a week (Regional Food Bank of Oklahoma, 2015). This allows those who would otherwise not know where their next meal is coming from, to have access to food.

The Fresh Rx program, developed by the Regional Food Bank of Oklahoma, focused specifically on low-income people located in Oklahoma County. Among Regional Food Bank of Oklahoma clients, 67% were at or below the federal poverty level. In Oklahoma County 16.1% of the population lived below the poverty line, with 24% of this population not having medical insurance (Oklahoma State Department of Health, 2014). Low-income and lack of medical insurance makes it difficult to obtain healthy foods and get adequate healthcare, especially for medical conditions that require consistent medication and monitoring.

#### Low-Income Food-Insecure Health Disparities

Along with the low-income connection to obesity, low-income and food insecurity have also been found to relate to other diet related diseases. Seligman et al. (2010) compared National Health and Nutrition Examination Survey (NHANES) participants who were low-income and food-insecure with food-secure participants on their rates of three diet sensitive chronic diseases: hypertension, hyperlipidemia, and diabetes. The subjects of this study included men and women 18-65 years old, participated in NHANES during a six year period (1999-2004), and reported an income less than 200% of the federal poverty level. Overall their findings showed a significant

relationship between food insecurity and the rates of clinical hypertension (systolic blood pressure >140 mm Hg or diastolic blood pressure >90 mm Hg) and diabetes (fasting plasma glucose > or equal to 126 mg/dL). Food-insecure adults were 21% more likely to suffer from hypertension, and were approximately 50% more likely to suffer from diabetes, than those who were food-secure. Seligman et al. (2010) also found a significant relationship not only between food insecurity and the prevalence of diabetes, but also between food insecurity and inadequate control of diabetes treatment.

Increased rates of hypertension have also been found in the food-insecure population (Irving et al., 2014). Self-reported survey data from the 2009 Behavioral Risk Factor Surveillance System (BRFSS) was analyzed from 12 states, including Oklahoma, to determine the relationship between food insecurity and hypertension. There were 36,757 adults included in this analysis. Food insecurity was measured by one question “How often in the past 12 months would you say you were worried or stressed about having enough money to buy nutritious meals?” (Irving et al., 2014 p. 1). Hypertension was self-reported by a yes or no question: “Have you ever been told by a doctor, nurse, or health professional that you have high blood pressure?” Irving and colleagues (2014) found overall food-insecurity to be 17.3 percent, and overall self-reported hypertension to be 37.4 percent. Calculations showed an increased prevalence in hypertension in those who were food insecure (PR 1.22). After adjusting for age, sex, race/ethnicity, education, percentage of federal poverty level, health insurance coverage, marital status, and current smoking status, a consistent trend was reported (PR 1.27). Overall this shows that people who suffer from food insecurity have an increased prevalence of hypertension, regardless of demographics. Irving and colleagues (2014, p.2) proposed that “actions to remove barriers to accessing affordable, healthful foods could decrease the prevalence of hypertension without directly ameliorating other factors”, which is one of the goals of the Fresh Rx program.

## The Food Insecurity Obesity Paradox

Research has shown there is a relationship between income and health disparities (Seligman et al., 2010). More adults in America with incomes below \$25,000 were obese (36%), compared to 32.8% of those who made \$25,000 to \$49,999. This trend in lower obesity rates and rising incomes continued with 30.8% of adults being obese with incomes between \$50,000 to \$74,999, and only 26.3% of adults, with an income of \$75,000 and above, being obese, (United Health Foundation, 2016). A similar income related trend was found in diabetes prevalence rates, 17.4% of adults in the lowest income category had diabetes, 12.4% and 9.8% in the medium income categories, and 6.9% of those in the highest income category had diabetes (United Health Foundation, 2016). This shows a distinct trend that individuals with low-incomes are more likely to suffer from diet-related diseases than those with higher incomes.

This introduces the concept of the food insecurity-obesity paradox. This concept was introduced as early as 1995 relating the high rates of obesity with the food-insecure population (Dietz, 1995). This paradox comes from the theory of obesity originating from overconsumption; and food-insecure populations lacking access to sufficient food. One example of a study that depicts the food insecurity-obesity paradox was conducted by Townsend et. al. (2001) who found a positive relationship between food insecurity and overweight status in women. This study was conducted on 4,537 women and 5,004 men over 20 years of age, using Continuing Survey of Food Intakes by Individuals (CSFII) data. While there were no significant findings for the male population, their findings showed a close, dependent relationship between overweight status and food insecurity for women. Overweight status in women was defined as exceeding a body mass index (BMI) of  $27.3 \text{ kg/m}^2$ . A smaller percentage (41%) of women who self-reported mild food insecurity (enough but not always the kinds of food we want to eat) were overweight compared to 52% who were moderately food-insecure (sometimes not enough to eat). It was also reported that the lowest income group had the highest overweight rate at 43.8 percent. Of those in the lowest

income group who reported receiving food stamps 51.8% were overweight. Of the women who reported using food stamps, the rate of the women considered to be overweight increased with the severity of their food insecurity: mild (48.4%), moderate (53.7%), and severe (68.3%). Not only did this study show a relationship between food insecurity and being overweight, it also showed a relationship with the use of food-stamps and being overweight.

The relationship between participation in the food stamp program and obesity in women was also studied by Gibson (2003), who found results consistent with the findings of Townsend et al. (2001) cited above. The results showed that women enrolled in the Food Stamp Program showed significantly higher rates of obesity (29.7%) when compared to those not enrolled in the food stamp program (19.8%) (Gibson, 2003). This study defined obesity as exceeding a BMI of 30 kg/m<sup>2</sup>, which may account for the lower percentages in obesity cited in this study.

#### Diet Quality

Obesity, hypertension and diabetes can be linked to diet related factors, such as energy density. Energy density of a diet is defined as the amount of kilocalories per gram of food. Typically energy dense foods are high in refined grains, added sugars, and added fats, and are palatable, inexpensive and convenient (Mendoza et al., 2007). In a study by Mendoza et al. (2007), they found dietary energy density to be an independent predictor of obesity, elevated fasting insulin levels, and metabolic syndrome in U.S. adults. Energy density has a significant association with higher BMI and waist circumference in women and similar trends in men.

Although Mendoza et al. (2007) found energy density directly impacted obesity and fasting insulin, it is the diet quality over the density which has been shown to lead to being overweight for food-insecure individuals (Basiotis et al., 2003). By analysis of NHANES II data, Basiotis and Lino found that women in food-insufficient households, and those in food-sufficient households, had similar overall energy intakes (1,959 kcal/day vs. 1,868 kcal/day). They did, however, find a



significant difference in diet quality. They measured diet quality by using the Healthy Eating Index (HEI), which scored the quality of the diet on how closely it followed the USDA's Food Guide Pyramid recommendations for fat, cholesterol, sodium and variety of the dietary intake. Each of the ten HEI categories was scored on a scale of 0 to 10, for an overall maximum score of 100. Scores above 80 were considered to be "good diets," while those below a score of 51 were considered to have a "poor" diet, and any score in between was considered to be a diet that "needs improvement." The HEI score of women in food-insufficient homes was 58.8, meaning their diets needed improvement, with a significantly lower score than food sufficient women (62.7). Food-insecure women consistently scored significantly lower on scores for vegetables (5.1 vs. 5.8), fruits (2.2 vs. 3.4), and food variety (6.4 vs. 7.2) than food-sufficient women. Food insufficient women were significantly more likely to be overweight (58%) than food-sufficient women (47%) (Basiotis et al., 2003).

These findings were supported in a more recent study in 2012 on the dietary quality of low-income adults in the Supplemental Nutrition Assistance Program (SNAP) (Leung et al., 2012). SNAP is a program that offers nutrition assistance to low-income families by providing financial help for food which is similar to the mission of food banks. In this study 3,835 adults, 20 to 65 years old, were interviewed through NHANES (1999-2006). The data obtained was used to evaluate the dietary intakes of individuals with incomes below 130% of the federal poverty level, 23% of who were receiving SNAP benefits at the time of the study. Diet quality was assessed by an updated version of the Healthy Eating Index, HEI-2005, and the Alternate Healthy Eating Index (AHEI). Most (84.2%) of SNAP participants were living below the poverty line and 43.6% experienced low or very low food security over the past year, compared to 71.0% of non-participants living below poverty level and 18.1% experiencing low or very low food security (Leung et al., 2012). Neither non-participants nor SNAP participants met the recommended daily amounts of whole grains, fruits, vegetables, and nuts/seeds/legumes. On average, fruit

consumption was 0.3-0.6 servings/day and vegetable intake was 0.7-1.0 servings/day. The opposite was observed with consumption of processed meats, sweets and bakery desserts, and sugar-sweetened beverages with both non-participants and participants in SNAP consuming more than the recommendations in each of these categories. It was also found that SNAP participants consumed 38% less whole grains. A greater percentage (21%) of SNAP participants met none of the daily intake recommendations, compared to 13% of non-participants (Leung et al., 2012).

The HEI-2005 assessment of dietary quality showed that fruit, dark-green and orange vegetables and legumes, and whole grains had the lowest scores for all participants. This was also consistent with the findings of the AHEI assessment (Leung et al., 2012). Overall scores for HEI-2005 and AHEI respectively were 44.4/100 and 21.1/87.5 for SNAP participants, and 47.9/100 and 24.6/87.5 for non-participants. This was reflective of low quality diets amongst all low-income participants, and even lower quality diets for those low-income participants receiving SNAP benefits.

In 2015, a systematic review consisting of 25 studies was conducted on the dietary quality of Americans by SNAP status by Andreyeva and colleagues (2015). This research reinforces that this government food assistance program (SNAP) is providing adequate energy intake for participants, but participants do not meet dietary quality needs. This lack of quality leads their clients to not meet their daily recommended intakes. When compared to higher income nonparticipants, SNAP participants ate less than three meals a day, and had lower intakes of vitamin C, calcium, fiber, and iron (Andreyeva et al., 2015). The quality of diet may be explained by the spending habits of SNAP participants that are reported to be focused more on beef and frozen foods, than fruit and vegetables (Andreyeva et al., 2015). This is important to the current research because SNAP is the largest government food assistance program that serves the low-income population. This is the same population the Regional Food Bank of Oklahoma serves, but through private charitable food sources.

The systematic review also compared 16 studies on low-income participants in SNAP and those who, while eligible to participate in SNAP due to their income level, were not participants in the program (Andreyeva, 2015). The comparisons consisted of meat, milk, fats and oils, sweets and desserts, vitamin A, vitamin B12, vitamin C, and sodium intake. The review showed no significant difference in the intake of these foods and nutrients by these two groups. The only difference found in diet quality was a significantly lower intake of zinc in SNAP participants compared to income eligible non-participants (Andreyeva, 2015). This systematic review of low-income diet quality may suggest that the predominately low-income clients of the food bank participants have very similar diet qualities as those who participate in government assistance programs, like SNAP.

#### Perceived Barriers to Nutritious Choices

As shown above, low-income, food-insecure individuals have poor quality diets that need to be addressed. Yet, there are various barriers to obtaining a healthy diet for this population. Food banks help to alleviate access to food, but they also face many barriers in providing healthy options to their clients.

In 2011, a qualitative study done in North Carolina determined six major barriers to consumption of fruits and vegetables in a low-income population: cost, transportation, quality, variety, a changing food environment and changing social norm (Haynes-Maslow, 2013). Over half of the 68 participants in the focus groups participated in SNAP. The most mentioned perceived barrier to fruit and vegetable consumption was the cost, which was mentioned four times more than the other perceived barriers. Cost was mentioned as a perceived barrier in multiple studies of low-income adults (Dammann et al., 2009; Hoisington et al., 2002). Dammam and Smith's (2009, p. 248) research mentioned "whether or not the participants had health problems, most felt that consuming a healthful diet was unrealistic when living on a limited income." Cost was also a

perceived barrier among food pantry users, citing that most participants shopped in bulk and opted for food substitutions like powdered milk, or canned fruits and vegetables and cheaper cuts of meat (Hoisington et al., 2002). The trend in all of these studies articles was quantity over quality, in order to stretch their food budget. Making fresh fruits and vegetables readily and locally available to low-income populations can help relieve some of the perceived barriers to fruit and vegetable consumption and increase dietary quality.

Cost is a major perceived barrier to fruit and vegetable consumption. This has been supported with research which corroborates that eating healthier does cost more (Cade et al., 1999). About 35,000 women from the UK Women's Cohort Study were sampled to assess the cost of their diets. Costs that were measured included direct monetary costs as well as indirect costs such as time, preparation, and attitudes. Food frequency questionnaires were given to all participants to assess the quality of their diets. Similar to previously mentioned studies, a "healthy diet indicator" (HDI) was developed based on World Health Organization (WHO) recommendations for the prevention of chronic diseases (Cade et al., 1999). To determine the monetary cost of the foods they compared the items from the food frequency questionnaire to average national food prices from the 1995 National Food Survey and the 1997 Tesco supermarket home shopping catalog (Cade et al., 1999). Telephone interviews were conducted with 52 women who had the lowest diet quality and 52 women who had the highest diet quality, to determine the direct and indirect costs for those with diets at each end of the spectrum.

Results showed that participants who scored the highest on diet quality compared to those who scored the lowest on diet quality, spent on average £540 (\$776.52) more per year on food costs (Cade et al., 1999). This stems from the food selection differences of both groups. The participants with the lowest quality diets spent the highest percent of their budget on meat, fish and eggs; compared to participants with the highest quality diets that spent the highest percentage of their budget on fruits and vegetables. High quality diet participants spent three times more of

their budget on fruits and vegetables than those with low quality diets, with a cost of about £1.87 pounds (\$2.69) per day.

On top of direct costs of a healthy diet, there are also indirect costs of time, preparation, and attitude to account for. There was a higher frequency of grocery shopping for the highest quality diet group (3.1 times/week) compared to the lowest quality diet participants (2.3 times/week) (Cade et al., 1999). The majority of both groups could access a store in less than 10 minutes, most traveled by car, and completed their shopping in 1- 1 ½ hours. Where the groups differed was the group with the highest quality diets (63%) bought more organic produce than those with the lowest quality diets (12%). Those with higher quality diets also had more access to homegrown produce (52%), compared to the participants with the lowest quality diets (15%), which may affect fruit and vegetable intake. Another indirect cost was determined to be the number of people in the home. Most of the women who had the highest quality diets were shopping for themselves or one other person, whereas those who had the lowest quality diets were shopping for 5 or more people. There were no significant differences found in preparation time between the participants with the lowest and highest quality diets. Both groups agreed that increased stress or having limited time would be a preventing factor to preparing a healthy meal (Cade et al., 1999).

Perceptions of the ease of eating a healthy diet was equal between the groups with the highest and lowest quality diets, with 52% of each group reporting it was easy (Cade et al., 1999). A difference was found between the groups in their perceptions of getting their families to eat healthy; fewer of the participants with the lowest quality diets believed that it was difficult with 35% compared to 46% of those with the highest quality diets. The belief that it costs more to eat healthy was reported by 40% of the lowest diet quality group, but only 29% of the highest diet quality group (Cade et al., 1999). The lowest quality diet group also perceived eating healthy would be more time consuming (62%), than the highest diet quality group (46%). They also differed in the perception that the availability of healthy food was a problem (highest diet

quality= 38%, lowest diet quality= 27%). Clearly the perceptions of eating healthy differ greatly between the women who adopted diets that met recommendations and those who did not meet the recommendations.

Cade and colleagues (1999) research confirmed the added direct and indirect cost of obtaining a healthy diet. For low-income individuals, the cost of nutritious food was one of the most prevalent barriers to adoption of a healthy diet. Fresh Rx removed the financial burden of obtaining nutritious food, and increases access to fresh fruits and vegetables to aid those with diet-related diseases.

Even though the Fresh Rx program was able to provide healthy options for their clients, food banks face many barriers to providing these options. A study was conducted to determine if introducing more nutritious foods into the food bank system would relieve perceived barriers of intake, as well as align with the preferences of the participants in the emergency food system (Campbell et al., 2011). Fifteen food pantries within the service area of Food Bank of Central New York were selected to be included in the study. On the days of distribution interviewers administered a questionnaire to participants to evaluate their food preferences. They were asked to rate how important it was to them to have certain foods available at a food pantry, using a Likert-scale of very important, important, somewhat important, and not important. Almost all (98%) of participants said that “having nutritious food available for them to choose at the food pantry was either very important or important” (Campbell et al., 2011, p. 183). The participants were asked to rank the foods they would most prefer to receive from the food pantry. The highest ranked was meat, poultry/fish, second highest ranked were vegetables, fruit followed, and candy was the least preferred. Most (90%) of the participants said meat/poultry, vegetables, fruit, cheese, eggs, and milk were very important or important to get from the food pantry. Soda, candy, and snacks were considered to be not important or somewhat important to 85% of participants. This trend shows a preference towards more nutritious options by the food pantry

participants. The majority of participants also showed a preference for fresh fruits (72%) and vegetables (51%) over canned or frozen.

Directors of each food pantry were also interviewed to determine their preferences and perceived barriers. Of these directors, 80% “indicated that food pantries should only distribute healthy foods” (Campbell et al., 2011, p. 185). Yet, the inconsistent availability, cost and storage of these healthy foods were all perceived as barriers to offering more meat/poultry/fish, refrigerated milk, whole wheat bread, and fresh fruits and vegetables.

When the actual food distributions were observed, 7 out of 15 pantries offered fresh vegetables, 33% offered fresh fruit, and only 4 out of the 15 offered both fresh fruit and fresh vegetables (Campbell et al., 2011). This study recognizes that some food banks are offering more nutritious choices consistent with the preferences of the majority of the participants in their programs and staff members.

As diet quality becomes increasingly important in the food bank setting more nutrition programs and policies are being introduced, which also introduces more barriers. Little research has been conducted in this field until recently, when food bank staff were asked to report on their perceived barriers to nutrition policies in a qualitative study (Handforth et al., 2013). A sample of 20 different food banks of the Feeding America network, of which the Regional Food Bank of Oklahoma is a part, conducted interviews with directors, chief executive officers, and staff in charge of the nutrition programs to assess nutrition policies and initiatives and their barriers to implementing them. Three main themes emerged from the interviews: 1) nutrition profiling systems, 2) nutrition policies, and 3) fresh produce. Several food banks were currently utilizing various nutrition profiling systems in order to evaluate the nutrition value of the products they distributed. One food bank used a method that measured their ability to provide seven key nutrients in order for their food-insecure clients to reach the recommended daily intake. Another

ranked their products by nutritional value, availability, economic worth and client preference on a ten point scale. The problem some of the interviewees had with nutrition profiling was the belief that there would always have to be a nutrition professional on staff in order for this to be successful. What was suggested as a potential solution was that Feeding America should develop a standardized nutrition profiling system to be used by all of the participating food banks.

The profiling systems were seen as a critical aspect of implementing nutrition policies in order to increase the quality of the foods being offered at each bank (Handforth et al., 2013). These systems have been used in order to reflect the positive changes of food quality to donors and executives in the food bank system. When implementing nutrition policies some food banks reported being referred to as the “nutrition or food police.” Some felt as if these policies were restrictive and these limitations would threaten donor relationships. Reports of donors being lost due to the changes were reported, but they were replaced with donors who offered more healthful options, that the food banks preferred.

As mentioned earlier in this paper, cost was mentioned to be the largest barrier to providing fresh produce. This increased the importance of food banks providing fresh fruits and vegetables to their low-income, food-insecure clients. These individuals typically have inconsistent fruit and vegetable intake due to inadequate monetary means or simply not having access to fruit and vegetables. Numerous food banks reported barriers of offering more fresh produce such as cost, finding donors and community partners, as well as storage and distribution (Handforth et al, 2013). Success in finding fresh produce was cited, for example: “A food bank in the Midwest experienced the noted abundance of produce when it received six semi-truckloads of apples after simply asking an apple growing organization what happens to end of season crop” (Handforth et al., 2013, p. 414). Numerous food banks have already implemented various means to deal with the changing needs for distribution and storage. Mobile pantries, which the Fresh Rx program used, have become more widely used. These mobile pantries bring the fresh produce directly to



their clients. Also, food banks are using “just in time” deliveries in order to avoid the storage needs. Although barriers to providing healthy options to their clients are prevalent, “many food banks in the study supported increasing fresh produce distribution as a way to fill nutritional gaps that put food-insecure individuals at risk for malnutrition and diet-related diseases” (Handforth et al., 2013, p. 415). This reinforces the perceived importance of food bank staff to increase the diet quality for the low-income, food-insecure population.

### Interventions with Low Income Populations

Only one recent evaluation has been done on a program similar to the Fresh Rx program. Therefore, this section will present multiple research studies conducted with low-income populations with closely related aspects to that of the Fresh Rx program.

Similar to the Fresh Rx program, other programs have been created to increase low-income individual’s access to fresh fruits and vegetables. The Fraser Region Harvest Box program in British Columbia worked with local producers to increase access to fresh fruits and vegetables for an affordable price (\$8) to food-insecure individuals, as an alternative to the charitable food system (Miewald et al., 2012). Food boxes consisted of 45 to 50 servings of about nine varieties of fruits and vegetables and were offered once a month. It was reported that 400 boxes were distributed every month in ten different communities.

To assess the effectiveness of the Fraser Region Harvest Box program 15-20 minute surveys were distributed. A baseline survey was conducted at the location of the food box distribution, and the follow-up survey was mailed to the same participants approximately eight months later.

Nonparticipants were randomly approached to complete the same survey at the same time and location of the food box distribution as a control group for comparison. This could be done because the distribution sites were at community centers, health clinics, and schools.

The baseline survey data reported results from 99 harvest box participants and 93 nonparticipants (Miewald et al., 2012). The only significant difference found was in BMI, with over half (53%) of the harvest box participants being overweight or obese, compared to 39% of nonparticipants. There was no statistically significant difference between participants and nonparticipants in self-reported fruit and vegetable consumption and food insecurity. In both groups 30% reported being food-insecure. Higher rates of food insecurity were not linked to employment status, but were linked to being young (18 to 39 years old) and living in a household with an income lower than \$20,000 annually.

Respondents who were food-insecure had a significantly lower average fruit and vegetable intakes (3.6 servings), compared to those who were food secure (5 servings) (Miewald et al., 2012). Overall vegetable intake averaged almost one less serving per day for the food-insecure (2.0 servings) individuals than the food secure (2.9 servings). There was also a significantly lower intake of salad (0.68 servings/day to 0.47 servings/day) and vegetables (1.2 servings/day to 0.81 servings/day) in food secure and insecure individuals respectively.

Ninety out of the 99 participants in the harvest box program responded to the follow up survey (Miewald et al., 2012). They were split into two categories: current (46) and former participants (44). Former participants reported expense (20%) and inconvenience (30%) as their reason for discontinuing participation in the program.

Overall the evaluation of the Fraser Region Harvest Box Program reflected potential benefits of increasing fruit and vegetable consumption, reflected by the higher intake of current participants (4.9 servings), compared to former (4 servings/day) or never participants (4.6 servings/day) (Miewald et al., 2012).

There were no significant results found when the Fraser Harvest Food Box program evaluated its impact on food security. Yet, they reported a “modest benefit of the food box program in terms of

food security” (Miewald et al., 2012, p. 64). The possible reasoning for this was suggested to be the cost, because those with high levels of food insecurity may have been unable to afford the cost of the food boxes. The Fraser Region Harvest Box Program evaluation reiterates the connection between low-income, food-insecure populations and low fruit and vegetable intakes. It also illustrates how programs that offer fresh fruits and vegetables at lower or no costs can increase fruit and vegetable intake in this population.

Instead of only offering food to their participants, other interventions offered only education. A community-based nutrition education intervention to increase fruit and vegetable consumption among low-income African American women was conducted in 2000 to 2005 and its effectiveness was assessed in relation to the participants’ body size (Klassen et al., 2008). The intervention, funded by the American Cancer Society, targeted African American women 20 to 50 years old in Washington, D.C., public housing communities. For the intervention, there were six education sessions that lasted an hour and a half, over a three week time period. These were taught by an African American registered dietitian using the empowerment model. Self-efficacy, family-related problem solving skills, linking nutrition and health, food safety and sanitation, meal planning, budgeting, shopping and label reading, using recipes and menus, with actual cooking skills were the focus of the education.

To evaluate the program, in-person interviews were conducted in addition to dietary recalls. Height and weight measurements were taken to interpret BMI. Results were reported in terms of obese women and non-obese women. Obesity was defined as a BMI greater than or equal to 30, which accounted for 49% (n=77) of participants (Klassen et al., 2008). Psychosocial influence on diet change reflected that more obese women (97%) reported “thinking about eating more fruits and vegetables” compared to the non-obese women (88%). Perceptions of the ability to eat fruits and vegetables when time was an issue were higher in non-obese (70%) women than obese women (54%). Motivation to change diet habits was much greater in obese women, but their

barriers to change such as education and self-efficacy were more prevalent than non-obese women.

Diet was assessed by 24-hour recall and the diet quality was determined by the USDA Healthy Eating Index (HEI). At baseline the recommendation of five servings per day was not met by either the obese or non-obese groups (Klassen et al., 2008). Obese women reported having fewer servings of fruits and vegetables per day and lower HEI scores. Non-obese women consumed an average of  $3.7 \pm 0.3$  servings, and obese women averaged  $2.8 \pm 0.4$  servings per day.

Measurements of fruit and vegetable intake after attending classes increased obese women's intake to  $3.2 \pm 0.5$  servings per day, but at the follow up, intake servings were equal to baseline  $2.8 \pm 0.4$ . The non-obese women actually declined intake from  $3.7 \pm 0.3$  servings per day from baseline to  $3.0 \pm 0.3$ .

This intervention reflects the potential positive impact of an educational intervention on low-income, obese women (Klassen et al., 2008). It also showed how the starting weight of the participants may play a defining role on how effective the intervention is, and should potentially be taken into consideration when assessing behavior change.

A program that combined education along with access to fresh fruits and vegetables (via farmer's market coupons) was evaluated for effectiveness with patients with type 2 diabetes mellitus (T2DM) (Weinstein et al., 2014). The participants of this intervention were recruited from diabetes clinics at Jacobi Medical Center in Bronx, New York, or referred to the intervention by their primary care doctor. It was reported that the majority of the population in this area was low-income and ethnically diverse, which is reflected in the intervention population (female 69%, Latino 48.7%, annual income less than \$20,000/ low-income 65%).

The intervention consisted of an educational facet and a fruit and vegetable purchasing incentive. The educational aspect focused on fruit and vegetable consumption and was based on the national

standards for Diabetes Self-Management Education (DSME) (Weinstein et al., 2014). Each of the 45 participants in the intervention group was required to attend one brief group education session that lasted an hour. They were conducted in either English or Spanish by a physician or trained medical student. The lessons were designed to cover three major topics: discussion of myths, discussion of facts, and create your plate exercise. This allowed instructors of the intervention to address barriers to fruit and vegetable consumption, whether it is myth or personal, as well as give them specific facts on diabetes and fruits and vegetables, in addition to an active, visual lesson creating a healthy plate. Participants were also provided with educational materials on dietary control of diabetes from the American Diabetes Association (ADA) and American College of Physicians.

The fruit and vegetable purchasing incentive aspect of the intervention offered \$6 in Health Bucks from the NYC Department of Health and Mental Hygiene (DOHMH) (Weinstein et al., 2014). These could be used at Green Markets to purchase fresh fruits and vegetables. The Green Markets were located in various places around New York, with one located in front of the Jacobi Medical Center. The control group, of 34 individuals, did not receive group education and were not given Health Bucks (Weinstein et al., 2014). Instead they received education by a certified diabetes educator or a dietitian and physician visits, which were considered to be the standard of care at the medical center.

Two surveys were conducted in order to assess the effectiveness of the intervention on fruit and vegetable consumption and the impact on diabetes control in participants. After the 12 week intervention period the results showed an increase in the mean fruit consumption  $0.2 \pm 1.0$  servings a day, whereas the control group decreased their daily fruit intake ( $-0.3 \pm 1.0$ ) (Weinstein et al., 2014). Although vegetable intake was not reported, a significant increase was also seen in the intervention group purchasing fruit and vegetables from a farmer's market (39% to 81%), and a smaller significant increase for the control group (32% to 48%). This intervention potentially

alleviated the cost barrier with 74% of intervention participants reporting problems affording fresh fruits and vegetables at baseline, and after 12 weeks only 55% reported difficulty.

To assess the secondary outcomes on diabetes control (BMI, weight, HbA1c, LDL-cholesterol, and blood pressure) electronic medical records were reviewed at baseline and 12 weeks (Weinstein et al., 2014). Between the intervention and control group there were no statistically different changes. BMI decreased by 0.4 kg/m<sup>2</sup> in the intervention group and 0.5 kg/m<sup>2</sup> in the control group. HbA1c levels also decreased in both groups, 0.8% in the intervention group and 0.9% in the control group. Systolic blood pressure increased by 0.6 mm Hg and diastolic blood pressure decreased by 2 mm Hg.

Overall this intervention reported a small increase in fruit consumption with brief education and small price incentives (Weinstein et al., 2014). To account for the lack of differences between the intervention and control group it was suggested that both groups benefitted from the positive impact of the standard of care interventions, which were reflected by improvements in BMI and HbA1c levels in both groups. In addition, the Health Bucks coupons were offered to other patients in the medical center, therefore participants in the control group may have also been receiving the coupons. The educational intervention was only a 60 minute session, and there was only a small incentive of six dollars, but the intervention still achieved a small increase in fruit consumption (Weinstein et al., 2014). If there were more directed education sessions or greater price incentives there is the potential to make a larger impact on fruit and vegetable consumption.

An additional educational intervention was conducted and focused on increasing fruit and vegetable intake in diabetics. As a part of the Missouri Health Literacy and Diabetes Communication Initiative, a diabetes education intervention, a secondary, observational analysis was done to relate food insecurity to changes in hemoglobin A1c (HbA1c), diabetes self-efficacy, and fruit and vegetable intake (Lyles et al., 2013). This randomized trial intervention was focused

in low-income primary clinics to improve diabetes self-management using an educational guide, *Living with Diabetes: An Everyday Guide for You and Your Family* (American College of Physicians Foundation, 2011).

Six hundred and sixty five individuals were included in the sample (Lyles et al., 2013). Two hundred and nineteen were reported to be food-insecure at baseline, with more than half (57%) having an income less than \$15,000 annually. Baseline measures reflected significant differences between food-insecure and food secure individuals in HbA1c levels, diabetes self-efficacy, and fruit and vegetable intake. More (32%) food-insecure individuals had HbA1c greater than or equal to 9%, compared to 21% of food secure. The mean HbA1c of  $8.4 \pm 1.9$  was higher in the food-insecure group compared to  $8.0 \pm 1.8$  in the food secure group. Mean diabetes self-efficacy also reflected significantly lower scores for the food-insecure compared to the food secure. Mean fruit intake in the food-insecure group was significantly lower than food secure ( $0.8 \pm 0.7$  compared to  $1.1 \pm 0.8$ ) as well as the mean vegetable intake ( $1.8 \pm 1.0$  compared to  $2.1 \pm 1.2$ ).

Although the food-insecure group had significantly lower scores at baseline for HbA1c levels, diabetes self-efficacy, and fruit and vegetable intake, they also showed significant improvements after one year (Lyles et al., 2013). Food-insecure individuals significantly increased their glycemic control with a 0.38% decrease in HbA1c percentage. This compared to the food secure group who showed no change in glycemic control (-0.01%). With adjustment for the 283 missing participants without follow up data, improvements in HbA1c still showed a 0.21% decrease; along with the significant increase in diabetes control and diabetes self-efficacy. The food secure group showed a small increase in self-efficacy. There was a significant increase in fruit intake in the food-insecure group compared to the food secure group. Neither group showed significant improvements in vegetable intake. From the evaluation of the diabetes educational intervention it shows that food-insecure individuals with diabetes can benefit from education and self-management interventions (Lyles et al., 2013).

The Fresh Rx program combined the provision of fresh fruits and vegetables along with education to attempt to increase fruit and vegetable intake, shown by these previous studies.

### Food Bank Interventions

Food banks have begun to implement more programs that are directed towards healthier eating.

The Northern Illinois Food Bank created a nutrition-education intervention to increase whole grain consumption and improve perceptions and self-efficacy in choosing and preparing whole grain foods (Yao et al., 2013). This intervention was done through a food pantry in the Northern Illinois Food Bank network and the Community Cupboard, which serves over two hundred families per month.

The nutrition education on whole grains was conducted on various levels. On the first level, facts about whole grains were orally presented, this included whole grains messages like “whole grains for your whole family” and “make half of your grains whole” (Yao et al., 2013). The second level of education was food tasting. A chicken and whole grain pasta recipe was selected for this intervention. Each participant tasted the dish and then received the recipe and a food bag that contained all of the ingredients. This led to the third level of education, the participant preparing the food themselves. Three interviews were conducted to assess the effects of the intervention. The first was conducted at the site of the tasting where trained interviewers asked the questions verbally and recorded the answers. This was followed one week later with a telephone interview. After one month another interview was conducted in person at the food pantry site.

There were 205 participants in the intervention, 98% were women 18-91 years old (Yao et al., 2013). There was a control group of 204 food pantry users who did not receive the intervention. The chicken and whole grain pasta dish was reported to be well liked (93%) and easy to prepare (97%) by participants in the intervention group. When participants in the intervention group were asked to report their perceptions on their family’s whole grain consumption, 78% reported an



increase, compared to 51% in the control group. When choosing and preparing whole grain foods the intervention group reported higher self-efficacy than the control group. This showed high effectiveness in increasing whole grain consumption, which is an important aspect of a healthy diet. The Fresh Rx program also provides whole grains to their participants to promote a well-rounded healthy diet and integrates cooking and recipes into their program to increase consumption.

Other food banks also implemented programs not only directed at increasing healthy eating, but also managing specific diet related diseases. Three food banks in the Feeding America network (Food Bank of Corpus Christi, Texas; the Redwood Empire Food Bank, in Santa Rosa California; and Mid-Ohio Food Bank) were chosen to conduct a pilot study assessing the effectiveness of a food bank based program that provided participants with diabetes appropriate food to manage their diet sensitive disease (Seligman, 2015). This was the first evaluation of a food bank program directed towards diabetes management with the provision of disease specific dietary options. Four different components were determined as the focus of the intervention: screening and monitoring, distribution of diabetes appropriate foods, primary care referral, in addition to self-management and education.

Screening and monitoring were conducted at clinics that partnered with each of the food banks or by food bank staff, at food pantries or food collection sites. When tested at food distribution sites, blood glucose testing was used. If the individual had a measurement above or equal to 140 mg/dL, or fasting level equal to or above 120, or they had been previously diagnosed with diabetes, the individual was tested with a point-of-care hemoglobin A1c (HbA1c) test (Seligman, 2015). To qualify to participate in the intervention participants had to have HbA1c levels greater than or equal to 6.5% or currently take diabetes medication.

Food boxes were assembled by registered dietitians or certified diabetes educators that contained: whole grains, lean meats, beans, low-sodium vegetables, no sugar added fruit, and shelf stable dairy products (Seligman, 2015). Also provided were fresh produce, milk, yogurt, cheese, bread and frozen lean meat. These boxes were predicted to last approximately one or two weeks depending on the household size and they were distributed once or twice a month. Diabetes education was provided to participants in a community based setting. Due to the intervention allowing the different food banks to implement these core components, details as to how much education participants received as well as who provided the education was not provided.

The evaluation sample consisted of 687 participants who had HbA1c levels greater than or equal to 6.5% or had proof they had diabetes. Of this population, most were food-insecure (more than 80%), 41% had less than a high school education and more than 50% were Hispanic or Latino. In order to qualify for the sample, baseline, follow up, and survey data were completed by the participant.

HbA1c measurements were taken at baseline and then again approximately six months post enrollment in the intervention. Results found a significant decrease in HbA1c levels (8.11% to 7.96%) and significantly fewer participants qualified as having very poor glycemic control than at baseline (28% to 25%) (Seligman, 2015). There was a significant decline in HgA1c in the participants who had uncontrolled diabetes (defined as HbA1c greater than or equal to 7.5%) from 9.52% to 9.04%. There were also significant improvements in daily fruit and vegetable intake overall (2.8 to 3.1 servings per day). As well as a significant improvements in fruit and vegetable intake in those with uncontrolled diabetes (2.8 to 3.0 servings per day). Almost all of the participants (88%) were satisfied with the food boxes assembled for individuals with diabetes, reporting they preferred those foods over the food pantry options (Seligman, 2015). Most participants (87%) reported that they ate all or most of the food they received with less than 10% reporting that they gave away the food box or disposed of it.

This evaluation of food bank programs that provide clients with diabetes appropriate food shows the potential of similar programs to increase diabetes control while increasing access to healthy foods in low-income populations.

## CHAPTER III

### METHODOLOGY

The Regional Food Bank of Oklahoma's Fresh Rx Program combined access to healthy food options, nutrition and lifestyle education, and medical interventions with the goal of improving health outcomes for low-income, food-insecure populations. This intervention was conducted in collaboration with Mary Mahoney Memorial Health Center and Integris Health's community clinic. These two health centers provide care to low-income populations, most of whom do not have insurance. The majority of their clients have been diagnosed with diabetes, hypertension and/or obesity. One hundred and twenty clients with at least one of these conditions were recruited by the site coordinators at these two health clinics to participate in the Fresh Rx Program. Before starting the program each participant was required to sign a consent form from their respective health clinic as well as a Regional Food Bank of Oklahoma consent form. Biomedical data from a comparison group of patients was chosen by similar criteria (attended the clinic and had diabetes, hypertension and/or obesity), but did not participate in the Fresh Rx program. This comparison data was provided by the Integris clinic. An analysis of the data allowed for a comparison between the intervention group and the comparison group to measure if the changes were due to the program or to outside influences.

The Fresh Rx program pilot program began in August 2015 and data were collected for this evaluation through May 2016. Over the course of the 10 months the program offered four

different components of the intervention. Wellness screenings were conducted at one of the partnering health centers, where measurements of weight, BMI, blood pressure and hemoglobin A1c levels were taken.

The Fresh Food Mobile Markets were the distribution centers of fresh fruits and vegetables. Food bank staff set up these mobile markets in the parking lots of each health clinic where they distributed food to clients, similar to a farmers market. Fresh Rx participants were scheduled to receive an average of about 30 pounds of fresh fruits and vegetables a month at no cost.

In addition to the fresh produce, Fresh Rx participants also received Healthy-Living Pantry Boxes. Shelf-stable food appropriate for individuals who are diabetic or hypertensive were contained in these boxes. Some examples of the food in the Healthy-Living Pantry Boxes were oatmeal, low-sodium chicken broth, 1% milk, unsweetened apple sauce, canned apricots in Splenda, tuna in water, whole wheat spaghetti, peanut butter, dry pinto beans, brown rice, unsalted peanuts, popcorn, diced tomatoes, and sliced carrots with no salt.

The comprehensive Fresh Rx program also provided nutrition education classes and healthy living resources. Nutrition education classes were provided on-site at both health clinics by clinic or food bank staff, and focused on helping participants manage their diabetes, hypertension, and/or obesity. To improve health outcomes, education was focused on good nutrition and exercise as core elements. Fresh Rx also offered cooking demonstrations and food tastings. Monthly healthy recipes were offered along with OK5210 handouts, which focused on consuming 5 or more servings of fruits and vegetables a day, two hours or less of screen time, one hour of physical activity, and zero sugar sweetened beverages. All educational classes and materials were also available in Spanish.

## Evaluation of the Fresh Rx Program

A short five to ten minute survey was developed by the evaluators to assess the effectiveness of the Fresh Rx program (See Appendix A). Questions were written for a third grade reading level and provided in both English and Spanish.

Questions 1 and 2 on the survey included a two item screening tool to assess food security prior to beginning the Fresh Rx program, similar to the 2-item screening tool used to identify families at risk for food insecurity (Hager et al., 2010). Question 5, 7, 8 and 9 also assessed current food insecurity with questions similar to those on the U.S. Household Food Security Survey (USDA, 2012). Access to fresh produce before and after the programs was addressed by questions 3 and 6, on a scale from easy to very hard. Question 4 asked if they had attended a nutrition class before the Fresh Rx program, and question 14 assessed where participants obtained fresh produce.

The current amount of healthy food they had in their home was assessed by question 8. Current intake of fruits and vegetables was measured by question 10, comparing one serving to the size of a fist. Questions 11 and 12 asked how much of the food from the program they ate on a scale from all to none, with question 12A addressing why they did not eat all of the food, if they did not eat it all. If they shared the food they received from the program and how many people they shared it with was answered by question 13. Questions 15 and 16 asked about the perceived impact the Fresh Rx program had on the control of their health, and if they believed their health improved as a result of the program. Overall satisfaction of the program was measured by question 17, on a Likert-scale of very happy to very unhappy accompanied by smiley faces.

The survey was translated to Spanish to accommodate Spanish speaking participants (See Appendix B). The survey was initially translated to Spanish by a bilingual MS, RD. This Spanish version was then translated back into English by a translator with a degree in Spanish from Venezuela, to check for translation consistency. The translators provided two different Spanish

terms for “Farmer’s Market”, so the bilingual food bank staff recommended use of the term “Plaza de mercado.”

Before distribution, the English and Spanish versions of the survey were reviewed by five food bank and clinic staff. One typographical error was corrected before distribution. These surveys were given to participants at Fresh Rx food distributions in November/December and February/March, by Fresh Rx staff. The follow-up surveys (See Appendix C and D), administered in May, omitted questions 13 and 14, so that demographic questions (age, gender, race/ethnicity, education) could be added. These demographic questions were added in order to describe the population Fresh Rx is serving.

Clinical data from the Fresh Rx Program participants were provided monthly, and the Integrus clinic provided data one time for the comparison group. Body Mass Index (BMI), blood pressure, and hemoglobin A1c levels (HbA1c, a measure of blood sugar control) were provided by the clinics. In addition, program attendance and food distribution data were provided by food bank staff. Fresh Rx sessions were conducted twice a month at Mary Mahoney and once a month at Integrus. For the purposes of comparison, clients who attended either session at Mary Mahoney during a month were counted as attending the program for the month. This evaluation was approved as exempt by the Oklahoma State University Institutional Review Board (see Appendix E).

#### Data Entry and Statistical Analysis

The survey responses were collected and entered by Fresh Rx staff into an Excel spreadsheet using client numbers in order to maintain confidentiality. This was also done by the health clinic staff when reporting clinical data of participants and the comparison group.

For the determination of food insecurity before Fresh Rx, participants were asked “Before Fresh Rx, you worried whether your food would run out before you got money to buy more.” and

“Before Fresh Rx, you ran out of food and did not have money to buy more.” If they responded “Often true” or “Sometimes true” to either of those statements, they were considered to be food insecure (Hager, et al 2010). For the determination of food insecurity during the program, participants were asked four questions about their current food situation (questions 5, 7, 8 and 9). If a participant indicated one of the following: their food never lasted until they had money to buy more, there was rarely or never enough food or healthy food in the home, or they did not know where their next meal was coming from, they were considered to be food insecure during the Fresh Rx program. Scoring for this question was similar to the scoring used for the U.S. Household Food Security Survey (USDA, 2012).

Data were exported into the Statistical Package for Social Sciences (SPSS) for analysis. Changes in survey responses over time were evaluated by chi square ( $\chi^2$ ). One-way analyses of variance were used to assess changes in clinical measurements over time for all participants. Paired t-tests were used to analyze the participants who had at least two measurements; we compared the first and last available reported clinical data (BMI, blood pressure, HbA1c). T-tests were also used to compare to the final clinical data of the participants and the clinical data of the comparison group. Differences were significant at  $p < 0.05$ .



## CHAPTER IV

### RESULTS

#### Survey Results

A total of 169 individual surveys were completed throughout the three survey distribution periods. At least one survey was completed by 87 Fresh Rx participants. Twenty nine of the participants completed all three surveys and 24 completed two of the three surveys. Demographic data was reported on the Fresh Rx Follow-Up Survey (Appendix C).

#### *Demographics*

As seen in Table 1, most of the participants in the Fresh Rx program were female (82.2%). Overall participants had a mean age of  $59.5 \pm 9.8$  years and a median age of 60 years; with ages ranging from 40 to 82 years old.

A larger portion of participants took the survey in English (63.2%) compared to Spanish (36.8%). There was little difference in the number of participants who identified as Latino (N=19), white (N=14) and black (N=12), with the highest percent of participants identifying as Latino (42.2%).

Many (42.2%) of the participants in the Fresh Rx program had less than a high school education and an equal amount of participants reported having a high school education or more than high school (28.9%)

*Food Distribution Volume*

The amount of nutritious food distributed by each of the Fresh Rx Mobile Food Pantry sites was reported by the Regional Food Bank staff. Food distributions began in August 2015 and continued until May 2015. Mary Mahoney conducted two food distributions per month, on the first Tuesday and third Tuesday of every month. Integris Community Clinic conducted only one

**Table 1: Demographic characteristics of participants**

<i>Characteristics</i>		
<b>Gender</b>		
<b>Male</b>	<b>N</b>	8
	<b>%</b>	17.8%
<b>Female</b>	<b>N</b>	37
	<b>%</b>	82.2%
<b>Age (years)</b>		
	<b>Mean</b>	59.5 ± 9.8
	<b>Median</b>	60
<b>Language</b>		
<b>English</b>	<b>N</b>	55
	<b>%</b>	63.2%
<b>Spanish</b>	<b>N</b>	32
	<b>%</b>	36.8%
<b>Race/ Ethnicity</b>		
<b>Latino</b>	<b>N</b>	19
	<b>%</b>	42.2%
<b>White</b>	<b>N</b>	14
	<b>%</b>	31.1%
<b>Black</b>	<b>N</b>	12
	<b>%</b>	26.7%
<b>Education</b>		
<b>Less than high school</b>	<b>N</b>	19
	<b>%</b>	42.2%
<b>High school</b>	<b>N</b>	13
	<b>%</b>	28.9%
<b>More than high school</b>	<b>N</b>	13
	<b>%</b>	28.9%

distribution per month. On average each participant received 27 pounds of food per distribution. Mary Mahoney distributed approximately 50% more food than Integris over the 10 month period (17,721 lbs and 11,679 lbs respectively) (Table 2). Overall the Fresh Rx program distributed almost 30,000 pounds of fresh food and pantry boxes to participants.

**Table 2: Number of pounds of nutritious food and pantry boxes distributed to participants (August 2015- May 2016)**

Location	Pounds Distributed
<b>Mary Mahoney</b>	
1 <sup>st</sup> distribution	9,231
2 <sup>nd</sup> distribution	8,490
<b>Total</b>	<b>17,721</b>
<b>Integris</b>	<b>11,679</b>
<b>Total</b>	<b>29,400</b>

Almost 145 individuals were provided with fresh produce and dietary-specific pantry boxes (Table 3). Mary Mahoney served more than half (61.5%) of all the participants. In total there were over 1,000 individual distributions.

**Table 3: Number of participants served at mobile markets (August 2015- May 2016)**

Location	Unduplicated # Served	Duplicated # Served
<b>Mary Mahoney</b>		
1 <sup>st</sup> distribution	45	339
2 <sup>nd</sup> distribution	43	333
<b>Total</b>	<b>45</b>	<b>672</b>
<b>Integris</b>	<b>55</b>	<b>422</b>
<b>Total</b>	<b>100</b>	<b>1,094</b>

#### *Education Sessions*

The average participant attended three months of Fresh Rx education. Most (59.6%) participants attended three or more months, including 23% who attended all six months, but a few (10%) never attended Fresh Rx education sessions after recruitment (Table 4).

**Table 4: Number of months of educational sessions attended by each participant**

# of Classes Attended	0		1		2		3		4		5		6	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
	11	9.6%	22	19.3%	13	11.4%	17	14.9%	14	12.3%	11	9.6%	26	22.8%

There was a significant difference in attendance between the locations ( $p \leq 0.001$ ). Participants at Mary Mahoney attended twice as many months of classes as participants at Integris, as seen in Table 5.

**Table 5: Educational attendance by location**

Location	N	Mean
Mary Mahoney	44	4.9 ± 1.7
Integris	70	2.2 ± 1.6

Over half of the participants did not attend a nutrition class before the Fresh Rx program (Table 6). A combined average of 41% of participants had attended a nutrition class before.

Table 6. Before Fresh Rx, did you ever attend a nutrition class?		Date			P-Value
		Nov/Dec	March	May	
Yes	N	32	19	18	0.521
	%	44.4%	38.8%	40.0%	
No	N	39	29	24	
	%	54.2%	59.2%	53.3%	
Not sure	N	1	1	3	
	%	1.4%	2.0%	6.7%	

### *Food Insecurity*

The following questions were asked in order to assess if the food insecurity of the participants changed as a result of the program.

In response to the question, “*Before Fresh Rx, you worried about whether your food would run out before you got money to buy more*”, most participants responded that this occurred often or sometimes (88.6%, 86%, 89.3%) for each survey period. Less than 15% reported that they “*never*” worried about running out of food before they had money to buy more (Table 7).

Table 7. Before Fresh Rx, you worried about whether your food would run out before you got money to buy more.		Date			P-Value
		Nov/Dec	March	May	
<b>Often</b>	N %	31 44.3%	11 22.0%	19 40.4%	0.137
<b>Sometimes</b>	N %	31 44.3%	32 64.0%	23 48.9%	
<b>Never</b>	N %	8 11.4%	7 14.0%	4 8.5%	
<b>Do not know</b>	N %	0 0.0%	0 0.0%	1 2.1%	

The majority of participants (84.7%, 76.6%, 85.1%) reported they “often” or “sometimes” ran out of food and did not have money to buy more (Table 8).

Table 8. Before Fresh Rx, you ran out of food and did not have money to buy more.		Date			P-Value
		Nov/Dec	March	May	
<b>Often</b>	N %	26 36.1%	8 17.0%	11 23.4%	0.222
<b>Sometimes</b>	N %	35 48.6%	28 59.6%	29 61.7%	
<b>Never</b>	N %	10 13.9%	11 23.4%	6 12.8%	
<b>Do not know</b>	N %	1 1.4%	0 0.0%	1 2.1%	

To evaluate participant’s food insecurity after the Fresh Rx Program participants were asked if the food they bought lasted until they had the money to buy more. There was a significant difference over time ( $p \leq 0.01$ ); more than half of the participants in November/December and May said the food lasted “sometimes” but in March 52% said the food “often” lasted (Table 9).

Table 9. Today, does the food you buy last until you have money to get more?		Date			P-Value
		Nov/Dec	March	May	
<b>Often</b>	N %	14 19.4%	26 52.0%	13 27.7%	<b>0.002</b>
<b>Sometimes</b>	N %	48 66.7%	23 46.0%	33 70.2%	
<b>Never</b>	N %	9 12.5%	1 2.0%	1 2.1%	
<b>Do not know</b>	N %	1 1.4%	0 0.0%	0 0.0%	

When participants were asked about the amount of food they had in their home while participating in the Fresh Rx program, the majority responded that they felt there was “*enough*” or “*often enough*” food (69.5%, 84%, and 84.8%). Less than 10% of respondents reported there was “*not enough*” food in their home during the Fresh Rx program (Table 10).

Table 10. Today, which describes the food in your home?		Date			P-Value
		Nov/Dec	March	May	
<b>Enough</b>	N %	21 29.2%	20 40.0%	20 43.5%	0.154
<b>Often enough</b>	N %	29 40.3%	22 44.0%	19 41.3%	
<b>Rarely enough</b>	N %	15 20.8%	4 8.0%	7 15.2%	
<b>Not enough</b>	N %	7 9.7%	4 8.0%	0 0.0%	

To assess food insecurity after participating in the Fresh Rx program, participants were also asked if they felt they knew where their next meal was coming from. For each survey period the majority of responders answered “*definitely yes*” and “*yes*” (74.6%, 85.1%, and 91.3%). Although not significantly different, more participants in November/December (25.3%) reported

that they didn't know where their next meal was coming from than in March (14.9%) and May (8.6%) (Table 11).

**Table 11. Today, do you feel like you know where your next meal is coming from?**

		Date			P-Value
		Nov/Dec	March	May	
<b>Definitely yes</b>	N %	12 16.9%	8 17.0%	8 17.4%	0.104
<b>Yes</b>	N %	41 57.7%	32 68.1%	34 73.9%	
<b>No</b>	N %	17 23.9%	7 14.9%	2 4.3%	
<b>Definitely no</b>	N %	1 1.4%	0 0.0%	2 4.3%	

To assess the healthy food participants had in their homes while partaking in the Fresh Rx program they were asked to describe the amount of healthy food in their home today. Most (69%) participants reported that there was “enough” or “often enough” healthy food. Fewer participants reported the amount of food they had as “rarely enough” (25.8%). Although not significantly different, more participants in March and May reported “enough” healthy food in their homes than in November/December (Table 12).

**Table 12. Today, which describes the healthy food in your home?**

		Date			P-Value
		Nov/Dec	March	May	
<b>Enough</b>	N %	15 20.8%	15 30.6%	18 38.3%	0.075
<b>Often enough</b>	N %	29 40.3%	21 42.9%	16 34.0%	
<b>Rarely enough</b>	N %	24 33.3%	8 16.3%	13 27.7%	
<b>Not enough</b>	N %	4 5.6%	5 10.2%	0 0.0%	

Numerous questions were used to determine the food security status of the participants (see the Methods chapter for a description of how food security was calculated). Table 13 represents the changes in food insecurity from before the program to when they were participating in the program. Columns show the responses of participants before they participated in the program and rows show the participants responses during the program. The table represents the comparison between the two.

Before the Fresh Rx program 93.4% of respondents indicated they were food insecure. After participation in the Fresh Rx program, only two participants indicated they remained food insecure and both of those respondents completed the November/December survey. The top left box of numbers shows those who were food insecure before the program AND food insecure during the program (N=2; 1.4%), showing that 2 participants were food insecure before and during the program. Below that box is a representation of participants in the program who were food insecure before but not food insecure during the program, which was 98.6% of the 142 responses of food insecurity before the program. The upper right box shows there were no participants who were food secure before the program who became insecure during the program. Finally, 10 participants experienced no food insecurity before and remained food secure during the program.

**Table 13. Food Insecurity during the Fresh Rx Program compared to food insecurity before the program**

<b>Food insecurity <u>during</u> the Fresh Rx Program</b>		<b>Food insecurity <u>before</u> Fresh Rx</b>	
		<b>Food insecure</b>	<b>No Food Insecurity</b>
<b>Food Insecure</b>	<b>N %</b>	2 1.4%	0 0.0%
<b>No Food Insecurity</b>	<b>N %</b>	140 98.6%	10 100%



*Accessibility to Nutritious Food*

Participants were asked how easy it was to access fresh produce before participation in the Fresh Rx program. Few reported it was “easy” (N= 5, 7, 1) to get fresh fruits and vegetables. Most participants reported it was “somewhat easy” (40.8%) or “hard” (43.7%) to obtain fresh fruits and vegetables before the Fresh Rx program (Table 14).

**Table 14. Before Fresh Rx, how easy was it to get fresh fruits and vegetables?**

		Date			P-Value
		Nov/Dec	March	May	
<b>Easy</b>	N %	5 7.0%	7 14.3%	1 2.1%	0.149
<b>Somewhat easy</b>	N %	26 36.6%	17 34.7%	24 51.1%	
<b>Hard</b>	N %	31 43.7%	22 44.9%	20 42.6%	
<b>Very hard</b>	N %	9 12.7%	3 6.1%	2 4.3%	

In contrast to the ease of obtaining fresh fruits and vegetables before the Fresh Rx program, participants were asked their current ease of obtaining fresh fruits and vegetables. Consistently the majority of participants reported obtaining fresh fruits and vegetables was “somewhat easy” (56.3%, 53.3%, and 61.7%) (Table 15).

**Table 15. Today, how easy is it to get fresh fruits and vegetables?**

		Date			P-Value
		Nov/Dec	March	May	
<b>Easy</b>	N %	11 15.5%	10 21.3%	9 19.1%	0.788
<b>Somewhat easy</b>	N %	40 56.3%	26 53.3%	29 61.7%	
<b>Hard</b>	N %	17 23.9%	10 21.3%	9 19.1%	
<b>Very hard</b>	N %	3 4.2%	1 2.1%	0 0.0%	

Fresh Rx participants reported a significant improvement ( $p < 0.001$ ) in access to fresh fruits and vegetables during the Fresh Rx program compared to before program participation (Table 16). Of the individuals who indicated it was “hard” or “very hard” to access fresh produce before the program, 60% indicated access was “easy” or “somewhat easy” during the program.

Table 16 provides a comparison between access to fresh fruits and vegetables before the program and during the program. The columns show the responses of participants before they participated in the program and the rows represent the responses during the program. The top left box shows the number of participants who reported it to be “easy” or “somewhat easy” to access fresh fruits and vegetables before the program, as well as during the program (N=71; 92.2% of the participants who said access was “easy” or “somewhat easy” before the program). The box below shows the few (N=6, 7.8%) participants who reported it was “easy” to “somewhat easy” to access produce before the program, yet reported it being “hard” or “very hard” to access fresh fruits and vegetables during the program. The top right box shows that 51 participants who reported that it was “hard” or “very hard” to access fresh fruits and vegetables before the program, but changed their ease of access during the program to “easy” or “somewhat easy”. The bottom right box shows the 34 participants who reported it to be “hard” or “very hard” for them to access fresh fruits and vegetables before and during the program.

**Table 16. Ease of access to fresh fruits and vegetables before the Fresh Rx Program compared to access during the program.**

Ease of access to fresh fruits and vegetables <u>during</u> the Fresh Rx Program		Ease of access <u>before</u> Fresh Rx	
		Easy or somewhat easy	Hard or very hard
Easy or somewhat easy	N %	71 92.2%	51 60.0%
Hard or very hard	N %	6 7.8%	34 40.0%

In the first two Fresh Rx Surveys participants were asked where they obtained their fresh produce. More than 70% of participants obtained their fresh fruits and vegetables from the Fresh Rx distribution (Table 17). The grocery store (55.7% and 70.3%) was the second most reported place where participants got their fresh produce. Although not significantly different, fewer participants received fresh fruits and vegetables from a food pantry in March (8.1%) than November/December (21.3%). The farmer’s market was the second least common place reported with an average of 11.5%. The least reported method of obtaining fresh produce was growing their own with less than 5% reported in November/December and none in March.

**Table 17. Where do you get your fresh fruits and vegetables?**

		Date			P-Value
		Nov/Dec	March	May	
<b>Fresh Rx Distribution</b>	<b>N</b>	47	27	*	0.649
	<b>%</b>	77.0%	73.0%		
<b>Grocery Store</b>	<b>N</b>	34	26		0.152
	<b>%</b>	55.7%	70.3%		
<b>Food Pantry</b>	<b>N</b>	13	3		0.086
	<b>%</b>	21.3%	8.1%		
<b>Farmer’s Market</b>	<b>N</b>	9	3	0.331	
	<b>%</b>	14.8%	8.1%		
<b>Grow your own</b>	<b>N</b>	3	0	0.171	
	<b>%</b>	4.9%	0.0%		

\*This question was not included on the May questionnaire

*Fruit and Vegetable Consumption*

To estimate the servings of fruits and vegetables participants were consuming, they were asked to compare one serving as the size of their fist and self-report the amount they consumed per day. The majority of participants estimated they were eating 2 to 3 servings of fruits and vegetables per day (58.3%, 65.3%, and 68.1%) (Table 18). Throughout the three survey periods on average 26.6% reported only consuming 0 to 1 serving per day. Few participants consumed 4 or more servings of fruit and vegetables per day (13.9%, 6.1%, and 8.6%).

**Table 18. A serving of fresh fruit or vegetables is the size of your fist. Now, how many servings of fresh fruits and vegetables do you eat in a normal day?**

		Date			P-Value
		Nov/Dec	March	May	
<b>0-1</b>	N %	20 27.8%	14 28.6%	11 23.4%	0.521
<b>2-3</b>	N %	42 58.3%	32 65.3%	32 68.1%	
<b>4-5</b>	N %	8 11.1%	1 2.0%	2 4.3%	
<b>5 or more</b>	N %	2 2.8%	2 4.1%	2 4.3%	

*Fresh Rx Food Consumption*

Each participant received fresh produce and a dietary-specific pantry box. The following questions were asked to evaluate how much of the food that they received was actually eaten. Over half (55%, 50%, 51.2%) of the participants reported eating all of the food from the pantry box and over 40% consistently reported eating most of the food from the box (Table 19).

**Table 19. How much food from the Fresh Rx food box do you eat?**

		Date			P-Value
		Nov/Dec	March	May	
<b>All</b>	N %	33 55.0%	18 50.0%	22 51.2%	0.938
<b>Most</b>	N %	25 41.7%	17 47.2%	20 46.5%	
<b>Half</b>	N %	1 1.7%	1 2.8%	1 2.3%	
<b>Less than half</b>	N %	1 1.7%	0 0.0%	0 0.0%	

On average, almost all (97.1%) of participants consumed “most” or “all” the fresh fruit and vegetables they received from the mobile pantry (Table 20). A follow up question was asked to evaluate the reason why participants did not consume all food (Table 21). The most common

**Table 20. How much fresh fruit and vegetables from Fresh Rx do you eat?**

		Date			P-Value
		Nov/Dec	March	May	
<b>All</b>	N %	33 58.9%	16 44.4%	25 56.8%	0.169
<b>Most</b>	N %	22 39.3%	20 55.6%	16 36.4%	
<b>Half</b>	N %	1 1.8%	0 0.0%	3 6.8%	

reason (29.3%) for not eating it all was it “*went bad*” before they could eat it. The second most common report was that they “*didn’t like it*” with an average of 16.8%. Few participants reported not eating it because they “*did not know how to prepare it*” or “*there was too much.*” Several participants (34.1%) reported “*none*” of these reasons for not eating all of the fresh produce they were given.

**Table 21. If you do not eat all the fresh fruits and vegetables, why?**

		Date			P-Value
		Nov/Dec	March	May	
<b>Went bad</b>	N %	12 27.9%	7 33.3%	8 27.6%	0.069
<b>Didn’t like it</b>	N %	2 4.7%	6 28.6%	5 17.2%	
<b>Did not know how to fix it</b>	N %	3 7.0%	4 19.0%	3 10.3%	
<b>Too much</b>	N %	3 7.0%	1 4.8%	3 10.3%	
<b>None</b>	N %	23 53.5%	3 14.3%	10 34.5%	

### *Food Shared*

Over 50% of participants reported sharing the food they received from the Fresh Rx program with 1 to 3 people in their home (Table 22). A smaller percentage (20.7%) shared their food with 4 or more people in their home and only 15.8% of participants reported not sharing their food. This question was not asked on the May survey.

Table 22. How many people in your home eat the food you get from Fresh Rx?		Date			P-Value
		Nov/Dec	March	May	
<b>Do not share</b>	N %	11 18.0%	5 13.5%	*	0.272
<b>1-3</b>	N %	33 54.1%	27 73.0%		
<b>4 or more</b>	N %	17 27.9%	5 13.5%		

\*This question was not included on the May questionnaire.

### *Health Perceptions*

Fresh Rx participants were asked if they felt they had more control over their health after participation in the program. An average of 67.5% of participants felt they had “*more control*” over their health, with over 70% reporting this in March and May (Table 23). A smaller percentage (29.4%) reported having “*more control, but not as much as they would like.*” Only a total of 4 participants in all surveys reported having “*no more control over their health than they did before.*”

Table 23. Do you feel you have more control over your health with the tools you learned from Fresh Rx?		Date			P-Value
		Nov/Dec	March	May	
<b>More control</b>	N %	35 58.3%	27 73.0%	32 71.1%	0.064
<b>More but not as much as I would like</b>	N %	25 41.7%	9 24.3%	10 22.2%	
<b>I do not have any more than I did before</b>	N %	0 0.0%	1 2.7%	3 6.7%	

Participants were asked if they perceived an improvement in their health because of the Fresh Rx program (Table 24). All participants answered “*definitely yes*” or “*yes.*”

Table 24. Do you think Fresh Rx improved your health?		Date			P-Value
		Nov/Dec	March	May	
<b>Definitely yes</b>	N %	21 36.8%	11 32.4%	19 43.2%	0.608
<b>Yes</b>	N %	36 63.2%	23 67.6%	25 56.8%	

*Program Satisfaction*

An average of 67.7% of participants reported being “*very happy*” with the program and 30% were “*happy*” (Table 25). Only one participant on the first survey reported feeling neutral about the Fresh Rx program and more of the participants were unhappy with the program.

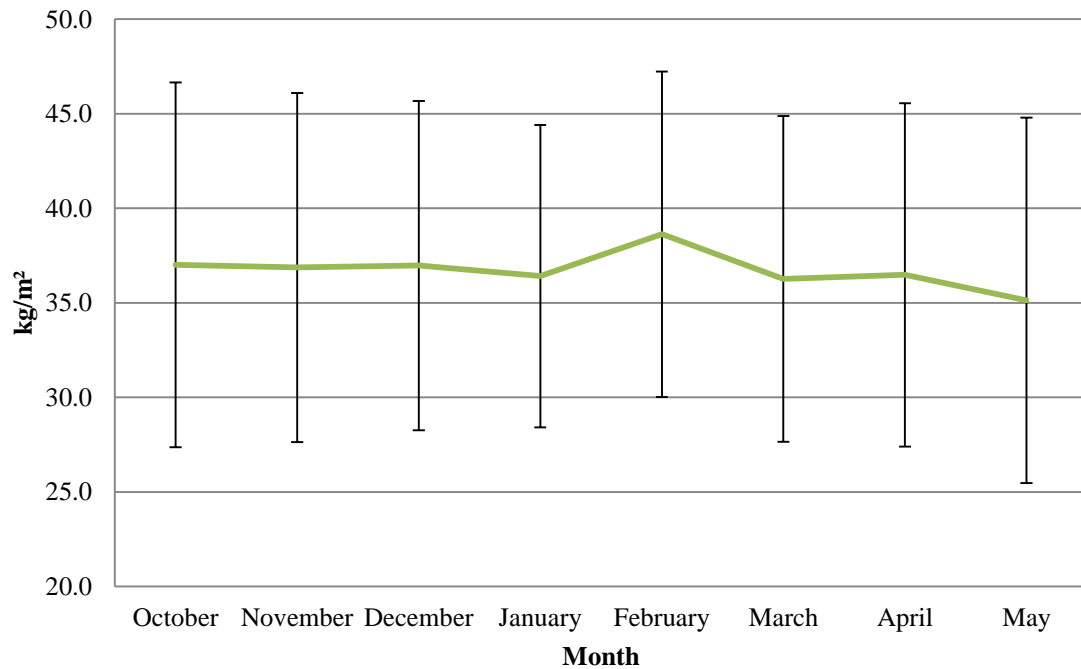
Table 25. How happy are you with Fresh Rx?		Date			P-Value
		Nov/Dec	March	May	
<b>Very Happy</b>	N %	43 70.5%	24 66.7%	29 65.9%	0.774
<b>Happy</b>	N %	17 27.9%	12 33.3%	15 34.1%	
<b>Neutral</b>	N %	1 1.6%	0 0.0%	0 0.0%	

## Clinical Results

Clinical measurements of BMI, HbA1c, and blood pressure, were reported monthly from October 2015 to May 2016 for those participants who attended the clinic during the month and had the measurement recorded (See also the table of data in Appendix D).

### *Obesity*

BMI measurements were used to assess changes in the participants' weight and obesity status throughout the program. The average BMI reported was greater than 30; obesity is defined as a BMI of 30.0 or higher (CDC, 2016). Figure 1 shows no significant change in mean BMI over time ( $p= 0.786$ ).

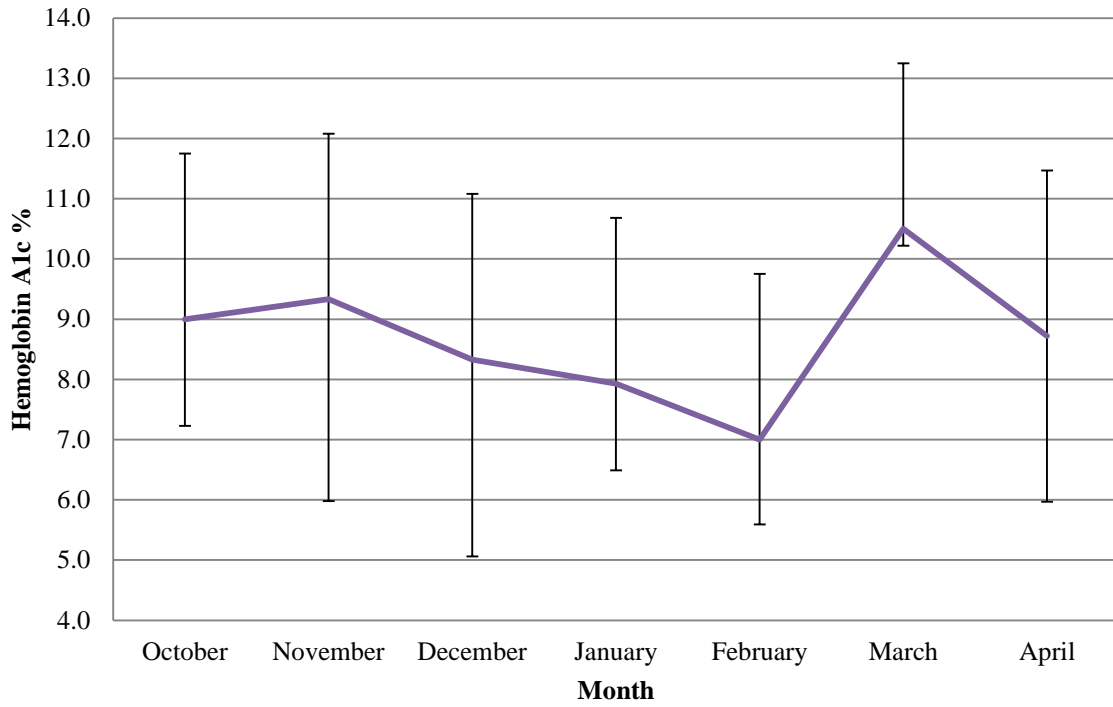


**Figure 1. Change in mean BMI over time.**



*Diabetes*

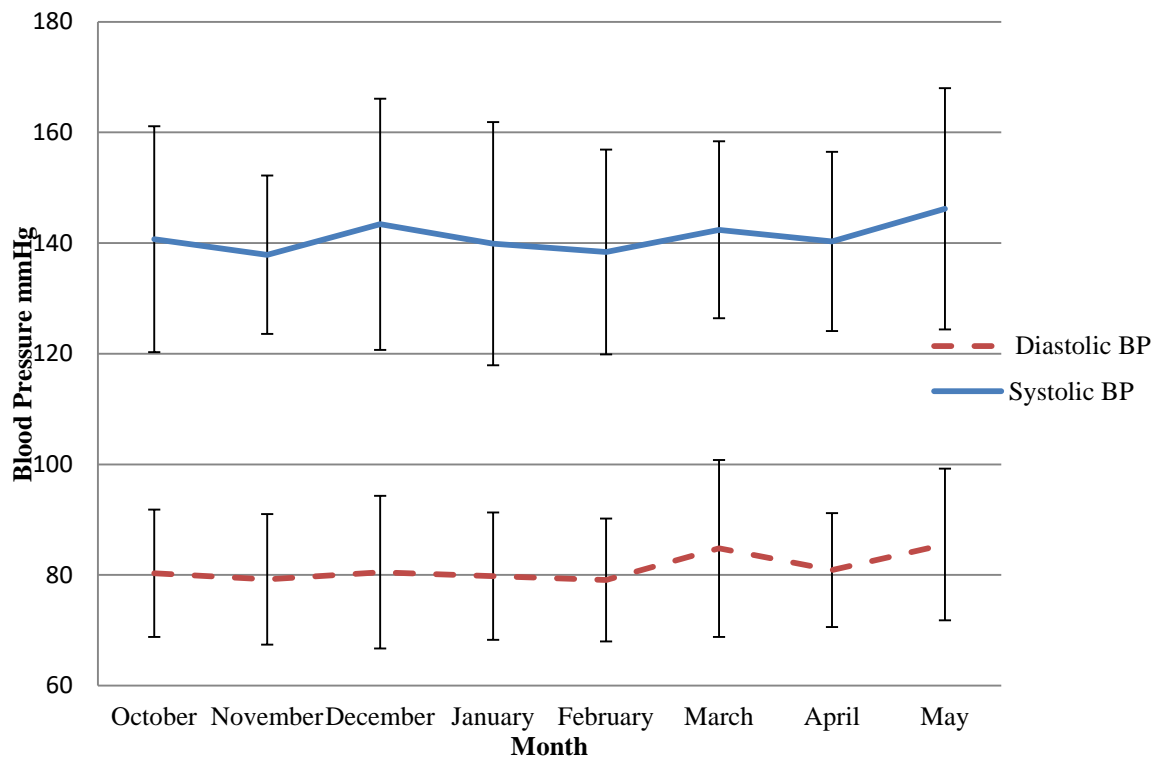
Control of diabetes was measured by HbA1c levels, which reflect the participants average blood glucose levels. The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK, 2014) defines diabetes as an HbA1c measurement of 6.5% or above. There was no significant change in HbA1c levels over time ( $p= 0.273$ ).



**Figure 2. Change in hemoglobin A1c levels over time.**

### Hypertension

The National Heart, Lung and Blood Institute (2015) defined being hypertensive as having a systolic blood pressure of 140 mmHg or higher or a diastolic measure of 90 mmHg or higher. In most months the average systolic blood pressure met the criteria for hypertension. Figure 3 reflects a slight increase of both systolic and diastolic blood pressure throughout the program, although neither increase was significant (systolic  $p=0.443$ , diastolic  $p=0.086$ ).



**Figure 3. Change in systolic and diastolic blood pressure over time.**

*Comparison of Clinical Measurements at the Beginning and End of the Program*

The first clinical measurements during the program for each individual participant were compared to their last reported measurements (Table 26). There were no significant differences in BMI, blood pressure or diabetes control between the first and last measurements for participants who had at least two measurements.

**Table 26. Comparison of clinical measurements at the beginning and end of the program**

	<b>N</b>	<b>Mean ± SD</b>	<b>Mean Change ± SD</b>	<b>P</b>
<b>BMI</b>				
<b>First Measurement</b>	98	36.17 ± 8.91		
<b>Last Measurement</b>	98	36.52 ± 9.09	0.07 ± 1.93	.702
<b>Systolic Blood Pressure</b>				
<b>First Measurement</b>	100	140.8 ± 19.2		
<b>Last Measurement</b>	100	139.7 ± 19.9	-1.7 ± 20.7	.427
<b>Diastolic Blood Pressure</b>				
<b>First Measurement</b>	100	80.8 ± 11.8		
<b>Last Measurement</b>	100	81.3 ± 12.8	0.37 ± 13.0	.776
<b>Hemoglobin A1c</b>				
<b>First Measurement</b>	14	8.43 ± 2.29		
<b>Last Measurement</b>	14	8.19 ± 2.09	0.06 ± 1.33	.859

*Comparison of Clinical Measurements between Fresh Rx Participants and a Comparison Group*

Fresh Rx participants' final clinical measurements were compared to a group of 15 individuals from the Integris Community Clinic, who did not participate in the program but qualified to participate (obese, diabetic, and/or hypertensive). Individuals in the comparison group had significantly lower BMI measurements than participants in the Fresh Rx program (Table 27).

**Table 27. Comparison of clinical measurements between Fresh Rx Participants and a Comparison Group**

	<b>N</b>	<b>Mean± SD</b>	<b>P</b>
<b>BMI</b>			
<b>Fresh Rx</b>	98	36.52 ± 9.09	.037
<b>Comparison</b>	15	31.24 ± 8.46	
<b>Systolic Blood Pressure</b>			
<b>Fresh Rx</b>	100	139.7 ± 19.9	.216
<b>Comparison</b>	15	146.8 ± 25.8	
<b>Diastolic Blood Pressure</b>			
<b>Fresh Rx</b>	100	81.3 ± 12.8	.768
<b>Comparison</b>	15	82.3 ± 9.2	
<b>Hemoglobin A1c</b>			
<b>Fresh Rx</b>	14	8.19 ± 2.09	.171
<b>Comparison</b>	13	9.61 ± 3.07	

Comparison of Integris and Mary Mahoney Results

*Survey Results*

When the responses of participants from Mary Mahoney and Integris clinics were compared, 8 out of the 17 questions asked on the surveys showed significant differences. Questions asked to assess participants status before the Fresh Rx program such as, “Before Fresh Rx, you ran out of food and did not have money to get more” as well as access to fresh fruits and vegetables, showed significant differences between sites ( $p < 0.05$ ). Participants from Integris were more likely (62.5%) than Mary Mahoney (47.4%) to say they “sometimes” ran out of food. More participants from Mary Mahoney (53.8%) than Integris (34.8%) said it was “hard” to access fresh produce before the program.

There were also significant differences between sites in some questions that were asked about their current status while enrolled in the Fresh Rx program. Integris participants were more likely (22.5%) to respond “there was rarely enough” healthy food in their home during the Fresh Rx

program compared to Mary Mahoney participants (7.6%). In addition, Mary Mahoney participants were more likely (23.1%) to “definitely” know where their next meal was coming from, compared to the small amount of Integris participants (11.6%) who felt similarly.

There were significant differences found in all of the questions asked about the amount of food from the Fresh Rx program participants consumed. For Mary Mahoney and Integris participants the reported amount of fresh fruits and vegetables they ate, as well as amount of food from the food box they ate were significantly different when compared by site ( $p < 0.001$ ). Participants from Integris were more likely (68.1%) to eat “all” of their food from the food box, compared to Mary Mahoney participants (37.1%). In addition, Integris participants were more likely (70.1%) to eat “all” of the fruits and vegetables, compared to Mary Mahoney participants (39.1%). This trend of significance continued with the follow-up responses asking why did they not eat all of the food they were given ( $p < 0.01$ ). Mary Mahoney participants were more likely (22.4%) to respond that they “did not like it,” than Integris participants (4.5%). Yet, Integris participants were more likely (18.2%) to report they did not eat all of the food because they “did not know how to fix it,” compared to Mary Mahoney participants (4.1%).

Finally, the last significant difference between the two locations was in the amount of participants who reported getting their fresh produce from the grocery store ( $p < 0.01$ ). More Mary Mahoney participants (75%) reported getting fresh fruits and vegetables from the grocery store, compared to Integris participants (45.7%). Detailed survey results from both clinics can be found in Appendix F and G.

### *Clinical Results*

Although there were several differences between the locations before and after the study, there were no differences in the change in clinical data in participants who had two or more clinical measurements (see Table 28). Participants from Mary Mahoney had higher BMI values than

participants from Integris at the first and last measurement time, but there was no significant difference between the locations in the change in BMI during the program. Systolic blood pressure was significantly lower in participants from Mary Mahoney than Integris at both measurements, but participants at both locations decreased systolic blood pressure over time. Similar results were observed for diastolic blood pressure but none of the differences were significant. In the first hemoglobin A1c measurements, there was a significant difference between the two sites with participants at Integris having a higher average HbA1c than participants at Mary Mahoney. There were no differences between the locations in the last HbA1c measurement or in the change in HbA1c.

**Table 28. Differences between Mary Mahoney and Integris clinics in clinical measurements**

	<b>Location</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>P value</b>
<b>BMI first measurement</b>	Integris	67	33.97	8.24	.001
	Mary Mahoney	48	39.23	8.97	
<b>BMI last measurement</b>	Integris	55	34.31	8.77	.006
	Mary Mahoney	43	39.36	8.80	
<b>Change in BMI</b>	Integris	55	-0.07	1.23	.393
	Mary Mahoney	43	0.26	2.56	
<b>Systolic blood pressure first measurement</b>	Integris	70	143.8	18.6	.044
	Mary Mahoney	48	136.5	19.3	
<b>Systolic blood pressure last measurement</b>	Integris	57	143.6	20.6	.024
	Mary Mahoney	43	134.5	17.8	
<b>Change in systolic blood pressure</b>	Integris	57	-0.9	22.7	.690
	Mary Mahoney	43	-2.6	17.9	
<b>Diastolic blood pressure first measurement</b>	Integris	70	82.5	11.5	.058
	Mary Mahoney	48	78.3	11.8	
<b>Diastolic blood pressure last measurement</b>	Integris	57	83.3	12.6	.069
	Mary Mahoney	43	78.7	12.6	
<b>Change in diastolic blood pressure</b>	Integris	57	0.0	14.0	.744
	Mary Mahoney	43	0.9	11.6	
<b>HbA1c first measurement</b>	Integris	26	9.42	2.38	<.001
	Mary Mahoney	18	7.03	1.17	
<b>HbA1c last measurement</b>	Integris	8	8.74	2.27	.278
	Mary Mahoney	6	7.47	1.76	
<b>Change in HbA1c</b>	Integris	8	-0.24	1.45	.346
	Mary Mahoney	6	0.47	1.15	

## CHAPTER V

### DISCUSSION

The present study evaluated the effectiveness of the Fresh Rx program, which combined access to healthy food, nutrition and lifestyle education, and medical interventions with the goal of improving health outcomes for low-income, food-insecure populations. In collaboration with Mary Mahoney Memorial Health Center and Integris Health's community clinic, 120 clients were sampled to evaluate the effectiveness of the program. The results of this evaluation showed that the Fresh Rx program assisted participants in becoming food secure, increased access to fresh fruits and vegetables, and improved participants' perceptions of their health and control over their health. However clinical measures of body weight, blood pressure, and diabetes control were not improved.

#### *Demographic Profile of Participants*

The participants in the Fresh Rx program were mostly older adults, ranging from 40 to 82 years old. Slightly less than half of participants had less than a high school education. The majority of participants were females who spoke either English or Spanish. With participants speaking both English and Spanish, it was beneficial to have educational sessions taught in both languages and bilingual resources for the recipe cards and teaching materials. It also presented no barriers to obtaining survey results because they were offered in both English and Spanish.

### *Food Distribution Volume*

Overall the Fresh Rx program was able to distribute a total of nearly 30,000 pounds of food from August 2015 to May 2016. The Mary Mahoney clinic distributed more food to participants than the Integris clinic. The differences in total distribution amount can be attributed to the Mary Mahoney clinic having two Fresh Rx food distributions per month, compared to Integris, which only conducted one food distribution per month.

Although total volume from each site differed, the average participant at both sites received 27 pounds of food per distribution. About 100 participants received food at one or more of the Fresh Rx distributions, totaling over 1,000 individual distributions in all.

### *Education Sessions*

Nutrition education sessions were conducted at both the Mary Mahoney and Integris Clinics. Sixty percent of Fresh Rx participants attended three or more educational sessions out of the six months. Slightly over 20% of participants attended at least one of the educational sessions in each of the six months.

Participants from the Mary Mahoney clinic attended an average of five monthly educational sessions, compared to Integris clinic whose participants attended an average of two educational sessions throughout the program. Mary Mahoney may have had a higher frequency of attendance in their educational sessions in part because they offered two educational sessions per month, which would allow participants more opportunities to attend the Fresh Rx sessions. Research indicates that a greater likelihood of successful dietary and physical activity change is associated with more contacts with educational programs (Greaves et al., 2011).

Participants who did not attend all, or only attended some educational sessions may have had various reasons. One possibility could be the lack of opportunity, especially at Integris which



only offered one opportunity per month. Another reason could be the location of the educational sessions. Mary Mahoney conducted educational sessions in the waiting room of their clinic, which had a small amount of space and a lot of surrounding activity which may have been distracting. Integris had a classroom space available to conduct the educational sessions, which may have allowed for more participants to attend. Another reason participants did not attend the educational sessions could be because some of the participants had work conflicts. Some potential ways to overcome these barriers would be to offer multiple education sessions at different times throughout the month.

Over half of participants reported they had not attended a nutrition class prior to the Fresh Rx program. This reinforces the importance of the educational aspect of the Fresh Rx program which allows participants to learn and understand healthy eating and healthy lifestyle choices.

#### *Food Insecurity*

The Fresh Rx program was developed to assist those who were food insecure. Six questions were used to evaluate the food security of all participants. The results showed that at the beginning of the program almost all of the participants reported being food insecure. When a comparison was conducted on food insecurity before and during the Fresh Rx program, only two participants reported staying food insecure after they participated in the program. Yet, these two respondents only completed the baseline survey at the beginning of the program. So the survey responses for these two participants may not adequately reflect the food insecurity status after participation in the program. Of those who were food insecure before the Fresh Rx program, 98.6% reported no food insecurity after the program. These results showed that the Fresh Rx program did have a strong positive effect on the food security of food insecure individuals. The distribution of food by the Fresh Rx program may be helping the low-income, food insecure participants stretch their food budget to increase their food security.

### *Accessibility of Nutritious Food*

Fresh Rx participants reported a significant improvement in access to fresh produce after they participated in the program. When participants were asked the source of their fresh fruits and vegetables, in November/December and March, the majority reported the Fresh Rx distribution. This would be expected during participation in the program. Participants were receiving on average 27 pounds of food per month, including fresh fruits and vegetables. Many participants also continued purchasing fresh produce from the grocery store. The third most reported source was a food pantry, however this source of food tended to decline over time. The use of food pantries by this group of participants was not unexpected due to their low-income, food insecure status and their previous involvement in food bank assistance programs.

The two least common sources of fruits and vegetables participants reported were farmer's markets and growing their own. This may be due to the lack of knowledge of the location of farmer's markets, as well as difficulties in obtaining transportation to get there. Growing fresh fruits and vegetables was reported by three participants in the first survey period, but by none in the following surveys. This may be due to lack of space, time, or knowledge. One possibility to increase the amount of individuals who grow their own vegetables is to incorporate some of the lessons from the Urban Harvest program that focuses on agricultural education and fresh food production (Regional Food Bank of Oklahoma, 2016).

### *Fruit and Vegetable Consumption*

The average Fresh Rx participant consumed 2 to 3 servings of fresh fruits and vegetables per day and there was no change over time. The OK5210 handouts given to participants highlighted the importance of consuming 5 servings or more of fruits and vegetables a day. Participants in the program were not meeting this goal, but most were at least consuming some fruits and vegetables

every day. Promotion of the benefits of fruit and vegetable intake could be more of a focus in the nutrition education.

In the current report servings of fruits and vegetables were measured by comparing one serving to the size of a fist. This comparison was used for a simple and accessible estimation of a cup of fruits or vegetables. Reports were made in the range of 0-1, 2-3, 4-5, or 5 or more servings, as an estimation of daily intake. It is possible that there was a small change in intake that was not reflected in responses to the question about consumption. For example, several studies have reported a significant increase of less than half a serving of fruits and vegetables (Lyles et al., 2013; Seligman et al., 2015, Weinstein et al., 2014).

With over 29,000 pounds of food distributed to Fresh Rx participants, it was important to evaluate how much of the food they were actually consuming. Analysis of the consumption of the distributed food was split up by the shelf stable food from the “food box,” and the fresh produce that they received. Ninety-seven percent of participants reported eating “*all*” or “*most*” of the food from the food box and the fresh fruits and vegetables.

To follow-up, participants were asked why they did not eat all the food they were given. The highest percent of reports (30%) of participants said that the food went bad before they were able to eat it. Fresh produce can spoil over a short period of time if it is not stored properly or eaten within a short amount of time. Participants were also given large amounts of fresh produce all at once, which they may have been unable to eat. They might have been trying to save the food to eat throughout the month and did not know how to store the food properly or did not have the equipment for safe storage. Potentially, instructions on storage of the fruits and vegetables contained at each distribution can be provided in order to give participants tips to make their fresh produce last throughout the month. Classes on food preservation are offered at the High Plains Food Bank of Amarillo in order to educate their participants on making their food last (High

Plains Food Bank, 2016). This is important to the Fresh Rx program due to the high volume of food distributed at one period of time, with the intention of it lasting an entire month.

Less than 20% of participants reported not liking the food they were given or not eating all of the food because they did not know how to prepare it. Recipe cards and samples were distributed to exemplify how to prepare the food they received in a way that would be appealing. Another potential option to increase the amount of participants who liked the food would be to offer a taste of all the foods available at the food distribution. Additional samples would give participants the opportunity to try foods they have never tried or foods they may assume they do not like because of the way they look. This could also decrease food waste. The educational sessions addressed issues such as these, but not all participants attended these educational sessions.

Information on cooking or preparation of the foods could be included with information on storage, to be distributed with the food. A recommendation from the California Association of Food Banks assessment on the impact of nutrition education at produce distribution suggested the development of a community recipe book (Perales, et al., 2012). This opportunity would allow participants to incorporate local and cultural aspects into their cooking and create a strong sense of community.

Finally, a small number (7%) of participants reported that they were given too much food at the food distributions, and that is why they did not eat it all. The amount of food given out at food distributions is supposed to last the participants throughout the entire month so providing additional information on storage may help the food last longer. For food insecure individuals receiving too much food may be better than not receiving enough food. It is hard to determine the appropriate amount of food to distribute because some individuals shared the food they receive from the Fresh Rx distribution and others did not.

Overall 84 percent of participants shared the food they received with other individuals in their homes, with the majority of them sharing with 1 to 3 other individuals. This high rate of sharing means that the healthy food options the Fresh Rx program provided was reaching more than just its participants and was helping more individuals eat healthy. As mentioned before, sharing the food does make it harder to gauge how much food was appropriate to distribute at food distributions. Some participants may be eating all of the food and others may be splitting that same amount of food among six people.

### *Health Perception*

The Fresh Rx program had a positive effect on the perceived health of their participants. The majority of respondents reported that they had “*more control over their health*” after participating in the program and that Fresh Rx had improved their health. Participants who feel improved control over their health have an increased confidence in their ability to overcome barriers to managing their disease (Contento, 2016). Overall the Fresh Rx program was successful in increasing their client’s perception of their health.

### *Program Satisfaction*

Reports on satisfaction with the Fresh Rx program were overwhelmingly positive. Ninety-eight percent of the participants reported being “*very happy*” or “*happy*” with the program. Throughout the survey period, there was only one report of feeling “*neutral*” about the program, which was reported in the first survey period in November/December. There were no negative reports of satisfaction of the program in any of the surveys, depicting the participants overall satisfaction with the Fresh Rx program.

### *Changes in Clinical Measurements*

Participants' BMIs were reported to assess obesity status. About 90% of participants were overweight or obese. There was no significant change in obesity for all participants from October to May or for those who had at least two BMI measurements. Participants in the Fresh Rx program had higher BMI measurements than the comparison group. This may indicate that clients with greater health needs participated in the program.

Participants in the Fresh Rx program also did not see a significant change in HbA1c levels, which was used to measure their diabetes control. The average HbA1c value of 8.2% was higher than the 7.0% recommended by the American Diabetes Association for control of type 2 diabetes mellitus (ADA, 2015).

Participants had a slight increase in both diastolic and systolic blood pressure measurements; however difference throughout the program was not a significant. The average systolic blood pressure remained at about 140 mm Hg throughout the program which indicated that many participants continued to meet the criteria for hypertension (NHLBI, 2015).

### Limitations

When reviewing this study it is important to note the limitations. First, the survey method of evaluation was self-reported. Self-reported surveys have inherent bias; reporting may be skewed in order to make the respondent look better in certain situations, such fruit and vegetable consumption. This also may be true for the income sensitive, food secure questions, in which individuals may have been embarrassed or did not want to disclose the severity of their insecurity. Yet, because this population was a part of the Regional Food Bank system and respondents were patients in low-income clinics, they have answered these types of questions frequently.

As mentioned in the discussion, the ranges to measure fruit and vegetable intake may not have been specific enough to detect a significant change. There were also not enough participants who answered all three surveys to be able to analyze change over time for the same participants. Therefore, comparisons across time included different people each time. In addition, no survey data was available for a comparison between participants and non-participants, so we could not account for outside factors that may have influenced the outcome of the current study.

The clinical data also presented several limitations. There were only 14 participants who had two HbA1c measurements, to analyze change over time. This small number of measurements led to the high variability in the results. A comparison group was used to compare the changes in clinical measurements, but it only consisted of 15 individuals from one of the clinics (Integrus). The clinic also provided only one-time measurements of the comparison group, instead of measurements over the course of the 10 months. Finally, the limited time period (October to May) in which clinical values were reported throughout the program, may not have been long enough to see significant changes in BMI, HbA1c, or blood pressure.

Additional limitations to the current research were the inconsistencies between both clinic locations. Mary Mahoney offered twice as many food distributions and educational sessions a month than Integrus. This influenced the larger amounts of food distributed at Mary Mahoney, as well as the number of people they who could access the program. Two opportunities to collect food each month could have influenced responses to why the Mary Mahoney participants did not eat all of the food. This was a similar situation with the educational sessions, two opportunities per month at Mary Mahoney and one at Integrus. Participants at Mary Mahoney had two opportunities to attend an educational session during each month, but the Integrus participants only had one opportunity to attend a monthly educational session. This influenced attendance results, and may have led to over estimation attendance at all educational sessions. Finally, a staff member at Mary Mahoney was conducting an additional research study in conjunction with the

Fresh Rx program. Additional surveys or measures may have influenced the reporting of the data and may have influenced their participation in the program.

Another limitation to the study was that foods eaten in addition to or instead of the foods distributed by the Fresh Rx program were not assessed or asked throughout the course of the program. Therefore, it is unknown if dietary habits had changed and if that may account for the insignificant change in clinical measurements.

### Recommendations

Including the recommendations in the above sections, further recommendations made by the authors are listed below.

#### *Focus on Disease-Specific Education*

The Fresh Rx program may be more successful in changing clinical outcomes in the future if the education is designed to help control diabetes, hypertension or obesity with greater involvement from health professionals in the clinics. Programs with aspects similar to the Fresh Rx program have shown success in significantly reducing Hb A1C levels in low-income individuals, who have been diagnosed with diabetes, yet these programs focused specifically on diabetes control, health professionals provided the education, and they had larger numbers of participants (Lyles et al., 2013; Seligman et al., 2015, Weinstein et al., 2014).

An educational intervention by the Missouri Health Literacy and Diabetes Communication Initiative, which focused on increasing fruit and vegetables intake in 665 individuals with diabetes, showed significant improvements in the proportion of participants with Hb A1c measurements above 9.0%, diabetes self-efficacy and significant, but small (0.2 servings per day) increases in fruit intake in food-insecure individuals (Lyles et al., 2013). For this study, clinic staff used an educational guide, *Living with Diabetes: An Everyday Guide for You and Your*



Family to teach diabetes self-management. Three food banks conducted a similar study assessing the effectiveness of a food bank based program that provided 687 participants with diabetes education and appropriate food to manage their diet sensitive disease (Seligman et al., 2015). The interventions resulted in significant improvements in the proportion of participants with Hb A1C measurements above 9.0% as well as small (0.3 servings per day) but significant increases in fruit and vegetable consumption per day. Each food bank had the freedom to adjust the design and implementation of the intervention, yet they all had to include certain core elements: “screening for diabetes monitoring of glycemic control, distributing diabetes-appropriate food once or twice monthly (enough to last one or two weeks, depending on household size), referring clients who lacked a usual source of care to primary care providers, and providing diabetes self- management support and education” (Seligman et al., 2015). Finally, an intervention in one low income clinic focused on diabetes also showed significant improvements in BMI and hypertension (Weinstein et al., 2014). A fruit and vegetable purchasing incentives program in New York provided 78 participants with education from certified diabetes educators or dietitians, and physician visits plus coupons for fresh fruits and vegetables. This intervention resulted in small (0.2 servings per day) increases in fruit intake, and decreases in BMI, Hb A1C, and diastolic blood pressure, but the clinical improvements were not significantly different from the control group.

Focusing Fresh Rx on participants with one condition may have a more significant impact on the overall control of the disease. Based on the results of the studies cited above, it may be more effective to partner with health professionals in the clinics to provide more intensive education focused on control of the diabetes, hypertension or obesity, rather than general nutrition information combined with routine care in the clinic. In addition, use of a structured guide or lesson plan that can stay consistent across educational sessions, especially in different locations should increase the integrity of the educational sessions (Contento, 2016; Baker et al., 2014). Finally, research indicates that a greater likelihood of successful diet and physical activity change

is associated with the use of techniques such as engaging social support, targeting both diet and physical activity, and using goal-setting (Greaves et al., 2011) so these techniques could be incorporated into the program.

#### *Partner With an Established Nutrition Education Program*

The Fresh Rx program may also benefit from partnering with programs such as the Supplemental Nutrition Assistance Program Education (SNAP-Ed) for adults or the Expanded Food, Nutrition, and Education Program (EFNEP) for families that can provide more intensive nutrition education without increasing cost to clients or the food bank. These federally funded nutrition education programs are collectively offered in Oklahoma as the Community Nutrition Education Program (CNEP, [www.cnep.okstate.edu](http://www.cnep.okstate.edu)). These programs use peer educators to teach in-depth lessons to low income adults on healthy eating, food safety, physical activity and food resource management. The nutrition education assistants (NEAs) work with participants individually or as a group. The program includes eight core lessons with the possibility of expanding to 21 lessons. Each lesson can take up to an hour and provides experiential activities such as cooking demonstrations and other food experiences. The program can be tailored to each individual and starts with the setting of goals. Research in health behavior change has indicated that when individuals set goals for behavior change they are more motivated to make and maintain the desired behavior, in this case, increasing their intake of fresh fruits and vegetables and increasing physical activity (Contento, 2016; Baker et al., 2014; Greaves et al., 2011).

SNAP-Ed and EFNEP programs have been proven effective in assisting individuals and families in need with nutrition education. Research on the effectiveness of the SNAP-Ed showed 83% of participants reduced chronic disease risk factors and over 50% of participants improved their intake of whole grains and fruit and vegetables (Sexton, 2013). Participants in this program also reported having 39% less hungry/food insecure days. The SNAP-Ed program also reduced food

waste by teaching proper storage techniques. Eighty-nine percent of adults who participated in EFNEP improved their nutrition practices (NIFA, 2015). In addition, those who participated in CNEP ran out of food less often and almost all participants showed a positive change towards a healthy diet (CNEP, 2016). By partnering with an established nutrition education program, the Fresh Rx program could increase the availability and opportunities for learning for their participants.

### *Conclusions*

The Fresh Rx program combined food distribution, nutrition education, and health screenings as an effective way to positively influence the food insecurity of low-income, food-insecure individuals with chronic diseases. Potentially improvements on program focus, intensity of nutrition education, and adjustments to content could improve the impact of the Fresh Rx program.

The Regional Food Bank of Oklahoma is overcoming barriers and taking on the task of managing diet related diseases in the low-income, food-insecure population by development of the Fresh Rx program. By increasing access, knowledge, and perceptions of healthy diets, this program has begun to combat the high rates of diet related diseases in the low-income, food-insecure population.

The Fresh Rx program has the potential to make a larger impact by partnering with health professionals to provide more structured, disease-specific education or partnering with established nutrition education programs such as SNAP-Ed or EFNEP that can provide more intensive nutrition education. Partnering with these programs, which have research supported results based on more intensive educational content, could aid the program in increasing participants ability to manage their diet related diseases.

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## APPENDICES



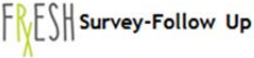





## Appendix A. Fresh Rx Survey

<div style="text-align: center;">  </div> <ol style="list-style-type: none"> <li>1. Before <b>Fresh Rx</b>, you worried about whether your food would run out before you got money to buy more.             <ol style="list-style-type: none"> <li>a. Often true</li> <li>b. Sometimes true</li> <li>c. Never true</li> <li>d. Do not know</li> </ol> </li> <li>2. Before <b>Fresh Rx</b>, you ran out of food and did not have money to buy more.             <ol style="list-style-type: none"> <li>a. Often true</li> <li>b. Sometimes true</li> <li>c. Never true</li> <li>d. Do not know</li> </ol> </li> <li>3. Before <b>Fresh Rx</b>, how easy was it to get fresh fruits and vegetables?             <ol style="list-style-type: none"> <li>a. Easy</li> <li>b. Somewhat easy</li> <li>c. Hard</li> <li>d. Very hard</li> </ol> </li> <li>4. Before <b>Fresh Rx</b>, did you ever attend a nutrition class?             <ol style="list-style-type: none"> <li>a. Yes</li> <li>b. No</li> <li>c. Not sure</li> </ol> </li> <li>5. Today, does the food you buy last until you have money to get more?             <ol style="list-style-type: none"> <li>a. Often true</li> <li>b. Sometimes true</li> <li>c. Never true</li> <li>d. Do not know</li> </ol> </li> <li>6. Today, how easy is it to get fresh fruits and vegetables?             <ol style="list-style-type: none"> <li>a. Easy</li> <li>b. Somewhat easy</li> <li>c. Hard</li> <li>d. Very hard</li> </ol> </li> <li>7. Today, which describes the food in your home?             <ol style="list-style-type: none"> <li>a. There is enough food to eat</li> <li>b. There is often enough food to eat</li> <li>c. There is rarely enough food to eat</li> <li>d. There is not enough food to eat</li> </ol> </li> <li>8. Today, which describes the <b>healthy</b> food in your home?             <ol style="list-style-type: none"> <li>a. There is enough healthy food to eat</li> <li>b. There is often enough healthy food to eat</li> <li>c. There is rarely enough healthy food to eat</li> <li>d. There is not enough healthy food to eat</li> </ol> </li> <li>9. Today, do you feel like you know where your next meal is coming from?             <ol style="list-style-type: none"> <li>a. Definitely yes</li> <li>b. Yes</li> <li>c. No</li> <li>d. Definitely no</li> </ol> </li> <li>10. A serving of fresh fruit or vegetable is about the size of your fist. Now, how many servings of fresh fruits and vegetables do you eat in a normal day?             <ol style="list-style-type: none"> <li>a. 0-1 servings</li> <li>b. 2-3 servings</li> <li>c. 4-5 servings</li> <li>d. 5 or more servings</li> </ol> </li> </ol> <p style="text-align: right; margin-top: 20px;">Client Number: _____</p>	<ol style="list-style-type: none"> <li>11. How much food from the <b>Fresh Rx</b> food box do you eat?             <ol style="list-style-type: none"> <li>a. All of it</li> <li>b. Most of it</li> <li>c. Half of it</li> <li>d. Less than half</li> <li>e. None</li> </ol> </li> <li>12. How much fresh fruit and vegetables from <b>Fresh Rx</b> do you eat?             <ol style="list-style-type: none"> <li>a. All of it</li> <li>b. Most of it</li> <li>c. Half of it</li> <li>d. Less than half</li> <li>e. None</li> </ol> <p>12A. If you do not eat all the fresh fruits and vegetables, why?</p> <ol style="list-style-type: none"> <li>a. It went bad before I could eat it</li> <li>b. I did not like what I was given</li> <li>c. I did not know how to fix it</li> <li>d. There was too much</li> <li>e. None of these</li> </ol> </li> <li>13. How many people in your home eat the food you get from <b>Fresh Rx</b>?             <ol style="list-style-type: none"> <li>a. I do not share</li> <li>b. 1-3</li> <li>c. 4-6</li> <li>d. 7 or more</li> </ol> </li> <li>14. Where do you get your fresh fruits and vegetables? (Check all that apply)             <ul style="list-style-type: none"> <li><input type="checkbox"/> a. Fresh Rx Distribution</li> <li><input type="checkbox"/> b. Food Pantry</li> <li><input type="checkbox"/> c. Farmer's Market</li> <li><input type="checkbox"/> d. Grocery Store</li> <li><input type="checkbox"/> e. Grow your own</li> </ul> </li> <li>15. Do you feel you have more control of your health with the tools you learned from <b>Fresh Rx</b>?             <ol style="list-style-type: none"> <li>a. I have more control of my health</li> <li>b. I have more control of my health, but not as much as I would like</li> <li>c. I do not have any more control over my health than I did before</li> <li>d. I do not have any control over my health</li> </ol> </li> <li>16. Do you think <b>Fresh Rx</b> improved your health?             <ol style="list-style-type: none"> <li>a. Definitely yes</li> <li>b. Yes</li> <li>c. No</li> <li>d. Definitely no</li> </ol> </li> <li>17. How happy are you with <b>Fresh Rx</b>?             <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;">      </div> <ol style="list-style-type: none"> <li>a. Very happy</li> <li>b. Happy</li> <li>c. Neutral</li> <li>d. Unhappy</li> <li>e. Very unhappy</li> </ol> </li> </ol> <p style="text-align: right; margin-top: 20px;">Client Number: _____</p>
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## Appendix B. Spanish Fresh Rx Survey

<div style="text-align: center;">  </div>	
<p>1. Antes de <b>Fresh Rx</b>, usted se preocupaba de que se le acabaran los alimentos antes de que usted tuviera dinero para comprar más</p> <p>a. Casi Siempre    b. A veces    c. Nunca    d. No lo se</p> <p>2. Antes de <b>Fresh Rx</b>, a usted se le acababan los alimentos y no tenía dinero para comprar más</p> <p>a. Casi Siempre    b. A veces    c. Nunca    d. No lo se</p> <p>3. ¿Antes de <b>Fresh Rx</b>, que tan fácil era conseguir frutas y verduras frescas?</p> <p>a. Fácil    b. Un poco fácil    c. Difícil    d. muy difícil</p> <p>4. ¿Antes de <b>Fresh Rx</b>, usted participo en alguna clase de nutrición?</p> <p>a. Sí    b. No    c. No estoy seguro</p> <p>5. ¿Hoy en día, los alimentos que compra le alcanzan hasta que tenga dinero para comprar más?</p> <p>a. Casi Siempre    b. A veces    c. Nunca    d. No lo se</p> <p>6. ¿Hoy en día, que tan fácil es conseguir frutas y verduras frescas?</p> <p>a. Fácil    b. Un poco fácil    c. Difícil    d. muy difícil</p> <p>7. ¿Hoy en día, cuál de estas frases describe los alimentos que tiene en su casa?</p> <p>a. Hay alimentos suficientes para comer  b. Casi siempre hay alimentos suficientes para comer  c. Rara vez hay alimentos suficientes para comer  d. No hay alimentos suficientes para comer</p> <p>8. ¿Hoy en día, cuál de estas frasea describe los alimentos <b>saludables</b> en su casa?</p> <p>a. Hay alimentos saludables suficientes para comer  b. Casi siempre hay alimentos saludables suficientes para comer  c. Rara vez hay alimentos saludables suficientes para comer  d. No hay alimentos saludables suficientes para comer</p> <p>9. ¿Hoy en día, usted cree saber de dónde vendrá su próxima comida?</p> <p>a. Definitivamente si    b. Sí    c. No    d. Definitivamente no</p> <p>10. Una porción de fruta o verdura fresca es aproximadamente del tamaño de su puño. Ahora, ¿cuántas porciones de frutas y verduras frescas come en un día normal?</p> <p>a. 0-1 porciones  b. 2-3 porciones  c. 4-5 porciones  d. 5 o más porciones</p>	<p>11. ¿Cuántos alimentos de la caja <b>Fresh Rx</b> come usted?</p> <p>a. Todos    b. La mayor parte    c. La mitad    d. Menos de la mitad    e. Ninguna</p> <p>12. ¿Cuántas frutas y verduras frescas de la caja <b>Fresh Rx</b> come usted?</p> <p>a. Todas    b. La mayor parte    c. La mitad    d. Menos de la mitad    e. Ninguna</p> <p>12A. Si usted no consumió todas las frutas y verduras frescas, por qué?</p> <p>a. Se dañaron antes de poderlas consumir  b. No me gustó lo que me dieron  c. Yo no sabía cómo prepararlas o comerlas  d. Había demasiadas  e. Ninguna de las anteriores</p> <p>13. ¿En su casa, cuántas personas comen alimentos de la caja <b>Fresh Rx</b>?</p> <p>a. Yo no comparto  b. 1-3  c. 4-6  d. 7 o más</p> <p>14. ¿De dónde obtiene sus frutas y verduras frescas? (Marque todas las que correspondan)</p> <p><input type="checkbox"/> a. Del programa <b>Fresh Rx</b>  <input type="checkbox"/> b. Banco de alimentos  <input type="checkbox"/> c. Plaza de mercado  <input type="checkbox"/> d. Tienda de alimentos  <input type="checkbox"/> e. Usted los cultiva</p> <p>15. ¿Usted siente que tiene más control de su salud con las herramientas que aprendió en el programa <b>Fresh Rx</b>?</p> <p>a. Tengo más control de mi salud  b. Tengo más control de mi salud, pero no tanto como quisiera  c. No tengo más control sobre mi salud del que tenía antes  d. No tengo ningún control sobre mi salud</p> <p>16. ¿Cree usted que el programa <b>Fresh Rx</b> mejora su salud?</p> <p>a. Definitivamente si    b. Sí    c. No    d. Definitivamente no</p> <p>17. ¿Qué tan satisfecho quedo con el programa <b>Fresh Rx</b>?</p> <div style="display: flex; justify-content: space-around; align-items: center;">      </div> <p>a. Muy satisfecho    b. Satisfecho    c. Neutral    d. Insatisfecho    e. Muy insatisfecho</p>
Numero de cliente: _____	Numero de cliente: _____

## Appendix C. Follow-Up Fresh Rx Survey

<div style="text-align: center;">  </div> <ol style="list-style-type: none"> <li>1. Before <b>Fresh Rx</b>, you worried about whether your food would run out before you got money to buy more.             <ol style="list-style-type: none"> <li>a. Often true</li> <li>b. Sometimes true</li> <li>c. Never true</li> <li>d. Do not know</li> </ol> </li> <li>2. Before <b>Fresh Rx</b>, you ran out of food and did not have money to buy more.             <ol style="list-style-type: none"> <li>a. Often true</li> <li>b. Sometimes true</li> <li>c. Never true</li> <li>d. Do not know</li> </ol> </li> <li>3. Before <b>Fresh Rx</b>, how easy was it to get fresh fruits and vegetables?             <ol style="list-style-type: none"> <li>a. Easy</li> <li>b. Somewhat easy</li> <li>c. Hard</li> <li>d. Very hard</li> </ol> </li> <li>4. Before <b>Fresh Rx</b>, did you ever attend a nutrition class?             <ol style="list-style-type: none"> <li>a. Yes</li> <li>b. No</li> <li>c. Not sure</li> </ol> </li> <li>5. Today, does the food you buy last until you have money to get more?             <ol style="list-style-type: none"> <li>a. Often true</li> <li>b. Sometimes true</li> <li>c. Never true</li> <li>d. Do not know</li> </ol> </li> <li>6. Today, how easy is it to get fresh fruits and vegetables?             <ol style="list-style-type: none"> <li>a. Easy</li> <li>b. Somewhat easy</li> <li>c. Hard</li> <li>d. Very hard</li> </ol> </li> <li>7. Today, which describes the food in your home?             <ol style="list-style-type: none"> <li>a. There is enough food to eat</li> <li>b. There is often enough food to eat</li> <li>c. There is rarely enough food to eat</li> <li>d. There is not enough food to eat</li> </ol> </li> <li>8. Today, which describes the <b>healthy</b> food in your home?             <ol style="list-style-type: none"> <li>a. There is enough healthy food to eat</li> <li>b. There is often enough healthy food to eat</li> <li>c. There is rarely enough healthy food to eat</li> <li>d. There is not enough healthy food to eat</li> </ol> </li> <li>9. Today, do you feel like you know where your next meal is coming from?             <ol style="list-style-type: none"> <li>a. Definitely yes</li> <li>b. Yes</li> <li>c. No</li> <li>d. Definitely no</li> </ol> </li> <li>10. A serving of fresh fruit or vegetable is about the size of your fist. Now, how many servings of fresh fruits and vegetables do you eat in a normal day?             <ol style="list-style-type: none"> <li>a. 0-1 servings</li> <li>b. 2-3 servings</li> <li>c. 4-5 servings</li> <li>d. 5 or more servings</li> </ol> </li> </ol> <p style="text-align: center;">(Please turn page over)</p> <p style="text-align: right;">Client Number: _____</p>	<ol style="list-style-type: none"> <li>11. How much food from the <b>Fresh Rx</b> food box do you eat?             <ol style="list-style-type: none"> <li>a. All of it</li> <li>b. Most of it</li> <li>c. Half of it</li> <li>d. Less than half</li> <li>e. None</li> </ol> </li> <li>12. How much fresh fruit and vegetables from <b>Fresh Rx</b> do you eat?             <ol style="list-style-type: none"> <li>a. All of it</li> <li>b. Most of it</li> <li>c. Half of it</li> <li>d. Less than half</li> <li>e. None</li> </ol> </li> <li>12A. If you do not eat all the fresh fruits and vegetables, why?             <ol style="list-style-type: none"> <li>a. It went bad before I could eat it</li> <li>b. I did not like what I was given</li> <li>c. I did not know how to fix it</li> <li>d. There was too much</li> <li>e. None of these</li> </ol> </li> <li>15. Do you feel you have more control of your health with the tools you learned from <b>Fresh Rx</b>?             <ol style="list-style-type: none"> <li>a. I have more control of my health</li> <li>b. I have more control of my health, but not as much as I would like</li> <li>c. I do not have any more control over my health than I did before</li> <li>d. I do not have any control over my health</li> </ol> </li> <li>16. Do you think <b>Fresh Rx</b> improved your health?             <ol style="list-style-type: none"> <li>a. Definitely yes</li> <li>b. Yes</li> <li>c. No</li> <li>d. Definitely no</li> </ol> </li> <li>17. How happy are you with <b>Fresh Rx</b>?             <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="text-align: center;">                   a. Very happy             </div> <div style="text-align: center;">                   b. Happy             </div> <div style="text-align: center;">                   c. Neutral             </div> <div style="text-align: center;">                   d. Unhappy             </div> <div style="text-align: center;">                   e. Very unhappy             </div> </div> </li> </ol> <p>A1. Age: _____ years</p> <p>A2. Gender: Male Female</p> <p>A3. Race/ethnicity</p> <ol style="list-style-type: none"> <li>a. Latino or Hispanic</li> <li>b. White</li> <li>c. Black or African American</li> <li>d. Native American, Asian or Other</li> </ol> <p>A4. Education</p> <ol style="list-style-type: none"> <li>a. Less than high school or GED</li> <li>b. High school or GED</li> <li>c. More than high school or GED</li> </ol> <p style="text-align: right;">Client Number: _____</p>
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## Appendix D. Fresh Rx Spanish Follow-Up Survey

Seguimiento de la Encuesta Fresh	
<p>1. Antes de <b>Fresh Rx</b>, usted se preocupaba de que se le acabaran los alimentos antes de que usted tuviera dinero para comprar más</p> <p style="margin-left: 20px;">a. Casi Siempre    b. A veces    c. Nunca    d. No lo se</p> <p>2. Antes de <b>Fresh Rx</b>, a usted se le acababan los alimentos y no tenía dinero para comprar más</p> <p style="margin-left: 20px;">a. Casi Siempre    b. A veces    c. Nunca    d. No lo se</p> <p>3. ¿Antes de <b>Fresh Rx</b>, que tan fácil era conseguir frutas y verduras frescas?</p> <p style="margin-left: 20px;">a. Fácil    b. Un poco fácil    c. Difícil    d. muy difícil</p> <p>4. ¿Antes de <b>Fresh Rx</b>, usted participo en alguna clase de nutrición?</p> <p style="margin-left: 20px;">a. Sí    b. No    c. No estoy seguro</p> <p>5. ¿Hoy en día, los alimentos que compra le alcanzan hasta que tenga dinero para comprar más?</p> <p style="margin-left: 20px;">a. Casi Siempre    b. A veces    c. Nunca    d. No lo se</p> <p>6. ¿Hoy en día, que tan fácil es conseguir frutas y verduras frescas?</p> <p style="margin-left: 20px;">a. Fácil    b. Un poco fácil    c. Difícil    d. muy difícil</p> <p>7. ¿Hoy en día, cuál de estas frases describe los alimentos que tiene en su casa?</p> <p style="margin-left: 20px;">a. Hay alimentos suficientes para comer b. Casi siempre hay alimentos suficientes para comer c. Rara vez hay alimentos suficientes para comer d. No hay alimentos suficientes para comer</p> <p>8. ¿Hoy en día, cuál de estas frasea describe los alimentos <b>saludables</b> en su casa?</p> <p style="margin-left: 20px;">a. Hay alimentos saludables suficientes para comer b. Casi siempre hay alimentos saludables suficientes para comer c. Rara vez hay alimentos saludables suficientes para comer d. No hay alimentos saludables suficientes para comer</p> <p>9. ¿Hoy en día, usted cree saber de dónde vendrá su próxima comida?</p> <p style="margin-left: 20px;">a. Definitivamente sí    b. Sí    c. No    d. Definitivamente no</p> <p>10. Una porción de fruta o verdura fresca es aproximadamente del tamaño de su puño. Ahora, ¿cuántas porciones de frutas y verduras frescas come en un día normal?</p> <p style="margin-left: 20px;">a. 0-1 porciones b. 2-3 porciones c. 4-5 porciones d. 5 o más porciones</p> <p style="text-align: center;">(Por favor, dele vuelta a la página)</p>	<p>11. ¿Cuántos alimentos de la caja <b>Fresh Rx</b> come usted?</p> <p style="margin-left: 20px;">a. Todos    b. La mayor parte    c. La mitad    d. Menos de la mitad    e. Ninguna</p> <p>12. ¿Cuántas frutas y verduras frescas de la caja <b>Fresh Rx</b> come usted?</p> <p style="margin-left: 20px;">a. Todas    b. La mayor parte    c. La mitad    d. Menos de la mitad    e. Ninguna</p> <p>12A. Si usted no consumió todas las frutas y verduras frescas, por qué?</p> <p style="margin-left: 20px;">a. Se dañaron antes de poderlas consumir b. No me gustó lo que me dieron c. Yo no sabía cómo prepararlas o comerlas d. Había demasiadas e. Ninguna de las anteriores</p> <p>15. ¿Usted siente que tiene más control de su salud con las herramientas que aprendió en el programa <b>Fresh Rx</b>?</p> <p style="margin-left: 20px;">a. Tengo más control de mi salud b. Tengo más control de mi salud, pero no tanto como quisiera c. No tengo más control sobre mi salud del que tenía antes d. No tengo ningún control sobre mi salud</p> <p>16. ¿Cree usted que el programa <b>Fresh Rx</b> mejora su salud?</p> <p style="margin-left: 20px;">a. Definitivamente sí    b. Sí    c. No    d. Definitivamente no</p> <p>17. ¿Qué tan satisfecho quedo con el programa <b>Fresh Rx</b>?</p> <div style="text-align: center; margin: 10px 0;">  </div> <p style="margin-left: 20px;">a. Muy satisfecho    b. Satisfecho    c. Neutral    d. Insatisfecho    e. Muy insatisfecho</p> <p>A1. Edad: _____ años</p> <p>A2. Sexo: Masculino    Femenino</p> <p>A3. Raza/etnia</p> <p style="margin-left: 20px;">a. Latino o Hispano b. Blanco c. Negro o Africano d. Amerindio, Asiático u otro</p> <p>A4. Nivel de Educación</p> <p style="margin-left: 20px;">a. Menos que preparatoria o GED b. Preparatoria o GED c. Mas que preparatoria o GED</p> <p style="text-align: right; margin-top: 20px;">Numero de cliente: _____</p>
Numero de cliente: _____	Numero de cliente: _____

## Appendix E. Institutional Review Board Approval

### Oklahoma State University Institutional Review Board

Date: Tuesday, November 10, 2015  
IRB Application No HE1565  
Proposal Title: Evaluation of effectiveness of the Fresh Rx Program of The Regional Food Bank of Oklahoma

Reviewed and Processed as: Exempt

**Status Recommended by Reviewer(s): Approved Protocol Expires: 11/9/2018**

Principal Investigator(s):

Leslie Lauck Gail Gates  
301 HES  
Stillwater, OK 74078 Stillwater, OK 74078

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The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

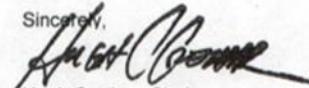
The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval. Protocol modifications requiring approval may include changes to the title, PI advisor, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of the research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Dawnett Watkins 219 Scott Hall (phone: 405-744-5700, dawnett.watkins@okstate.edu).

Sincerely,



Hugh Crethar, Chair  
Institutional Review Board

## **Appendix F. Integris Community Clinic Results**

### *Survey Results*

Participants from the Integris Community Clinic were mostly females (80.8%) with an average age of 58. These participants primarily completed the Spanish version of the survey (66.7%) and identified as Latino (73.1%). Only a small percent (15.4%, 11.5%) were white and black respectively. Over half (57.7%) of the participants had less than a high school education.

Participants in the Fresh Rx program who were patients of the Integris Community Clinic saw positive results for food security and control over their health with participation in the Fresh Rx program. Before the Fresh Rx program the majority (92.6%) of participants were “often or sometimes” worried that they would run out of food before they had money to get more. Yet, after the program 95%, and 100% in May, reported their food “often or sometimes” lasted until they had money to buy more and the majority of participants reported knowing where their next meal was coming from (75%).

When asked how many servings of fruits and vegetables they ate each day most (66%) of the Integris Community Clinic participants reported eating an average of 2 to 3 servings. All of the participants from the Integris clinic reported eating most or all of the fresh fruits and vegetables and the food from the food box given to them by the Fresh Rx program. A few participants reported not eating all the food because it “went bad” (24.6%) and they did not know how to prepare it (22.7%).

Perception of health for Integris community clinic participants was positive. All of the participants reported that they felt Fresh Rx improved their health, and the majority (70%) felt as if they had more control over their health. All participants were “very happy or happy with the Fresh Rx program,” except one reported feeling “neutral” on the baseline survey.

Detailed results can be seen below.

**Table 30 . Integris Demographics**

<i>Demographics</i>		
<i>Age (years)</i>		
	<b>Mean</b>	58.4 ± 9.3
	<b>Median</b>	56
<i>Language</i>		
<b>English</b>	<b>N</b>	15
	<b>%</b>	33.3%
<b>Spanish</b>	<b>N</b>	30
	<b>%</b>	66.7%
<i>Gender</i>		
<b>Male</b>	<b>N</b>	5
	<b>%</b>	19.2%
<b>Female</b>	<b>N</b>	21
	<b>%</b>	80.8%
<i>Race/ Ethnicity</i>		
<b>Latino</b>	<b>N</b>	19
	<b>%</b>	73.1%
<b>White</b>	<b>N</b>	4
	<b>%</b>	15.4%
<b>Black</b>	<b>N</b>	3
	<b>%</b>	11.5%
<i>Education</i>		
<b>Less than high school</b>	<b>N</b>	15
	<b>%</b>	57.7%
<b>High school</b>	<b>N</b>	6
	<b>%</b>	23.1%
<b>More than high school</b>	<b>N</b>	5
	<b>%</b>	19.2%

**Table 31. Integris survey results**

<i>Question</i>		<i>Date</i>		
		<b>Nov/Dec</b>	<b>March</b>	<b>May</b>
<i>Before Fresh Rx, you worried about whether your food would run out before you got money to buy more.</i>				
<b>Often</b>	<b>N</b> <b>%</b>	14 38.9%	7 25.0%	11 42.3%
<b>Sometimes</b>	<b>N</b> <b>%</b>	20 55.6%	18 64.3%	13 50.0%
<b>Never</b>	<b>N</b> <b>%</b>	2 5.6%	3 10.7%	1 3.8%
<b>Do not know</b>	<b>N</b> <b>%</b>	0 0.0%	0 0.0%	1 3.8%
<i>Before Fresh Rx, you ran out of food and did not have money to buy more.</i>				
<b>Often</b>	<b>N</b> <b>%</b>	13 36.1%	3 11.5%	6 23.1%
<b>Sometimes</b>	<b>N</b> <b>%</b>	19 52.8%	18 69.2%	18 69.2%
<b>Never</b>	<b>N</b> <b>%</b>	3 8.3%	5 19.2%	1 3.8%
<b>Do not know</b>	<b>N</b> <b>%</b>	1 2.8%	0 0.0%	1 3.8%
<i>Before Fresh Rx, how easy was it to get fresh fruits and vegetables?</i>				
<b>Easy</b>	<b>N</b> <b>%</b>	2 5.6%	4 14.8%	1 3.8%
<b>Somewhat easy</b>	<b>N</b> <b>%</b>	16 44.4%	11 40.7%	18 69.2%
<b>Hard</b>	<b>N</b> <b>%</b>	15 41.7%	10 37.0%	6 23.1%
<b>Very hard</b>	<b>N</b> <b>%</b>	3 8.3%	2 7.4%	1 3.8%



<i>Question</i>		<i>Date</i>		
		<b>Nov/Dec</b>	<b>March</b>	<b>May</b>
<i>Before Fresh Rx, did you ever attend a nutrition class?</i>				
<b>Yes</b>	<b>N</b> <b>%</b>	20 55.6%	12 44.4%	11 45.8%
<b>No</b>	<b>N</b> <b>%</b>	16 44.4%	14 51.9%	12 50.0%
<b>Not sure</b>	<b>N</b> <b>%</b>	0 0.0%	1 3.7%	1 4.2%
<i>Today, does the food you buy last until you have money to get more?</i>				
<b>Often</b>	<b>N</b> <b>%</b>	4 11.1%	14 50.0%	6 23.1%
<b>Sometimes</b>	<b>N</b> <b>%</b>	28 77.8%	13 46.4%	20 76.9%
<b>Never</b>	<b>N</b> <b>%</b>	4 11.1%	1 3.6%	0 0.0%
<b>Do not know</b>	<b>N</b> <b>%</b>	0 0.0%	0 0.0%	0 0.0%
<i>Today, how easy is it to get fresh fruits and vegetables?</i>				
<b>Easy</b>	<b>N</b> <b>%</b>	5 14.3%	5 20.0%	4 15.4%
<b>Somewhat easy</b>	<b>N</b> <b>%</b>	20 57.1%	16 64.0%	19 73.1%
<b>Hard</b>	<b>N</b> <b>%</b>	9 25.7%	3 12.0%	3 11.5%
<b>Very hard</b>	<b>N</b> <b>%</b>	1 2.9%	1 4.0%	0 0.0%

<i>Question</i>		<i>Date</i>		
		<b>Nov/Dec</b>	<b>March</b>	<b>May</b>
<i>Today, which describes the food in your home?</i>				
<b>Enough</b>	<b>N</b> <b>%</b>	7 19.4%	12 42.9%	8 32.0%
<b>Often enough</b>	<b>N</b> <b>%</b>	15 41.7%	12 42.9%	11 44.0%
<b>Rarely enough</b>	<b>N</b> <b>%</b>	12 33.3%	2 7.1%	6 24.0%
<b>Not enough</b>	<b>N</b> <b>%</b>	2 5.6%	2 7.1%	0 0.0%
<i>Today, which describes the healthy food in your home?</i>				
<b>Enough</b>	<b>N</b> <b>%</b>	6 16.2%	8 29.6%	8 30.8%
<b>Often enough</b>	<b>N</b> <b>%</b>	14 37.8%	13 48.1%	9 34.6%
<b>Rarely enough</b>	<b>N</b> <b>%</b>	17 45.9%	3 11.1%	9 34.6%
<b>Not enough</b>	<b>N</b> <b>%</b>	0 0.0%	3 11.1%	0 0.0%
<i>Today, do you feel like you know where your next meal is coming from?</i>				
<b>Definitely yes</b>	<b>N</b> <b>%</b>	4 11.1%	4 16.0%	2 8.0%
<b>Yes</b>	<b>N</b> <b>%</b>	18 50.0%	15 60.0%	20 80.0%
<b>No</b>	<b>N</b> <b>%</b>	13 36.1%	6 24.0%	2 8.0%
<b>Definitely no</b>	<b>N</b> <b>%</b>	1 2.8%	0 0.0%	1 4.0%

<i>Question</i>		<i>Date</i>		
		<b>Nov/Dec</b>	<b>March</b>	<b>May</b>
<i>A serving of fresh fruit or vegetables is the size of your fist. Now, how many servings of fresh fruits and vegetables do you eat in a normal day?</i>				
<b>0-1</b>	<b>N</b> <b>%</b>	12 33.3%	6 21.4%	6 23.1%
<b>2-3</b>	<b>N</b> <b>%</b>	22 61.1%	20 71.4%	17 65.4%
<b>4-5</b>	<b>N</b> <b>%</b>	2 5.6%	0 0.0%	2 7.7%
<b>5 or more</b>	<b>N</b> <b>%</b>	0 0.0%	2 7.1%	1 3.8%
<i>How much food from the Fresh Rx food box do you eat?</i>				
<b>All</b>	<b>N</b> <b>%</b>	19 63.3%	9 60.0%	19 79.2%
<b>Most</b>	<b>N</b> <b>%</b>	10 33.3%	6 40.0%	5 20.8%
<b>Half</b>	<b>N</b> <b>%</b>	1 3.3%	0 0.0%	0 0.0%
<b>Less than half</b>	<b>N</b> <b>%</b>	0 0.0%	0 0.0%	0 0.0%
<i>How much fresh fruit and vegetables from Fresh Rx do you eat?</i>				
<b>All</b>	<b>N</b> <b>%</b>	20 74.1%	9 60.0%	18 72.0%
<b>Most</b>	<b>N</b> <b>%</b>	7 25.9%	6 40.0%	7 28.0%
<b>Half</b>	<b>N</b> <b>%</b>	0 0.0%	0 0.0%	0 0.0%

<i>Question</i>		<i>Date</i>		
		<b>Nov/Dec</b>	<b>March</b>	<b>May</b>
<i>If you do not eat all the fresh fruits and vegetables, why?</i>				
<b>Went bad</b>	<b>N</b> <b>%</b>	4 19.0%	3 33.3%	3 21.4%
<b>Didn't like it</b>	<b>N</b> <b>%</b>	0 0.0%	1 11.1%	1 7.1%
<b>Did not know</b>	<b>N</b> <b>%</b>	2 9.5%	4 44.4%	2 14.3%
<b>Too much</b>	<b>N</b> <b>%</b>	1 4.8%	0 0.0%	1 7.1%
<b>None</b>	<b>N</b> <b>%</b>	14 66.7%	1 11.1%	7 50.0%
<i>How many people in your home eat the food you get from Fresh Rx?</i>				
<b>Do not share</b>	<b>N</b> <b>%</b>	5 16.1%	2 13.3%	*
<b>1-3</b>	<b>N</b> <b>%</b>	15 48.4%	9 60.0%	
<b>4 or more</b>	<b>N</b> <b>%</b>	11 35.5%	4 26.7%	
<i>Where do you get your fresh fruits and vegetables?</i>				
<b>Fresh Rx Distribution</b>	<b>N</b> <b>%</b>	22 71.0%	10 66.7%	*
<b>Food Pantry</b>	<b>N</b> <b>%</b>	8 25.8%	1 6.7%	
<b>Farmer's Market</b>	<b>N</b> <b>%</b>	4 12.9%	1 6.7%	
<b>Grocery Store</b>	<b>N</b> <b>%</b>	15 48.4%	6 40.0%	
<b>Grow your own</b>	<b>N</b> <b>%</b>	0 0.0%	0 0.0%	

<i>Question</i>		<i>Date</i>		
		<b>Nov/Dec</b>	<b>March</b>	<b>May</b>
<i>Do you feel you have more control over your health with the tools you learned from Fresh Rx?</i>				
<b>More control</b>	<b>N</b> <b>%</b>	18 58.1%	13 86.7%	17 65.4%
<b>More but not as much as I would like</b>	<b>N</b> <b>%</b>	13 41.9%	2 13.3%	6 23.1%
<b>I do not have any more than I did before</b>	<b>N</b> <b>%</b>	0 0.0%	0 0.0%	3 11.5%
<i>Do you think Fresh Rx improved your health?</i>				
<b>Definitely yes</b>	<b>N</b> <b>%</b>	14 50.0%	5 38.5%	11 44.0%
<b>Yes</b>	<b>N</b> <b>%</b>	14 50.0%	8 61.5%	14 56.0%
<i>How happy are you with Fresh Rx?</i>				
<b>Very Happy</b>	<b>N</b> <b>%</b>	22 71.0%	12 80.0%	18 72.0%
<b>Happy</b>	<b>N</b> <b>%</b>	8 25.8%	3 20.0%	7 28.0%
<b>Neutral</b>	<b>N</b> <b>%</b>	1 3.2%	0 0.0%	0 0.0%

### *Integrus Clinical Results*

For most clinical measurements Integrus Community Clinic most participants decreased or had no change. For the 55 participants who had at least two measurements, there was a slight average decrease in BMI from the first and last measurements of participants. However, 54.5% of participants from Integrus increased their BMI.

There was a small decrease in systolic blood pressure measurements by those from the Integrus clinic. More than half (56.1%) of participants lowered their systolic blood pressure or had no change over the course of the program.

Even though there was no change (0.0) in diastolic blood pressure, more participants decreased or maintained (56.1%) their diastolic blood pressure than those who increased it (43.9%).

Hemoglobin A1c measurements decreased over time by 0.24, with 5 out of 8 participants with two measurements decreasing their A1c level.

**Table 32. Average for first and last clinical measurements, in addition to the average change in these values for Fresh Rx participants from the Integrus clinic**

	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
<b>First BMI</b>	67	33.97	8.24
<b>Second BMI</b>	55	34.31	8.77
<b>Change in BMI</b>	55	-0.07	1.23
<b>First Systolic Blood Pressure</b>	70	143.8	18.6
<b>Second Systolic Blood Pressure</b>	57	143.6	20.6
<b>Change in Systolic Blood Pressure</b>	57	-0.9	22.7
<b>First Diastolic Blood Pressure</b>	70	82.5	11.5
<b>Second Diastolic Blood Pressure</b>	57	83.3	12.6
<b>Change in Diastolic Blood Pressure</b>	57	0.0	14.0
<b>First HbA1c</b>	26	9.42	2.38
<b>Second HbA1c</b>	8	8.74	2.27
<b>Change in HbA1c</b>	8	-0.24	1.45

**Table 33. Change in BMI for Fresh Rx participants from the Integrus clinic**

	<b>N</b>	<b>%</b>
<b>Decrease or no change</b>	25	45.5%
<b>Increase</b>	30	54.5%

**Table 34. Change in systolic blood pressure for Fresh Rx participants from the Integrus clinic**

	<b>N</b>	<b>%</b>
<b>Decrease or no change</b>	32	56.1%
<b>Increase</b>	25	43.9%

**Table 35. Change in diastolic blood pressure for Fresh Rx participants from the Integrus clinic**

	<b>N</b>	<b>%</b>
<b>Decrease or no change</b>	32	56.1%
<b>Increase</b>	25	43.9%

**Table 36. Change in HbA1c for Fresh Rx participants from the Integris clinic**

	<b>N</b>	<b>%</b>
<b>Decrease or no change</b>	5	62.5%
<b>Increase</b>	3	37.5%



## **Appendix G. Mary Mahoney Memorial Health Center Results**

### *Survey Results*

All Mary Mahoney participants spoke English. The majority of participants from Mary Mahoney were female (84.2%) with an average age of 61. There were almost equal amounts of white and black participants with 42.1% having more than a high school education.

Participants in the Fresh Rx program who were patients of the Mary Mahoney Memorial Health Center saw positive results for food security and control over their health with participation in the Fresh Rx program. Most (83.3%) participants from Mary Mahoney reported “often or sometimes” being worried about running out of food before they had time to get more. This was a similar trend in the other responses to questions about food insecurity before the Fresh Rx program.

When assessing Mary Mahoney participants for food insecurity status during the Fresh Rx program, A strong majority of participants reported that their food lasted until they had money to buy more (83.4%, 100%, 95.2%). This is similar to participants’ reports of there being “enough or often enough” food in their home while participating in the program. Over half of participants reported it to be “hard” to access fresh fruits and vegetables before the program, yet after the program over half reported it to be “easy or somewhat easy” to access.

The majority (61.4%) of Mary Mahoney participants ate 2 to 3 servings of fresh fruits and vegetables per day. The majority of participants reported eating “all or most” of the food from both the food box and the fresh fruits and vegetables. Those who did not eat all of the food they were given from the Fresh Rx program reported that they did not eat all of it because it “went bad” (34.3%), “did not like it” (25.8%), or had another reason that was not listed (25.8%). The

food that was distributed was typically shared with 1 to 3 other members in the household (70.9%).

All of Mary Mahoney participants felt as if the Fresh Rx program improved their health, and 67% believed that they had more control over their health than they did before. Overall 100% of Mary Mahoney participants were “very happy or happy” with the Fresh Rx program.

Detailed results can be seen below.

**Table 37. Mary Mahoney Demographics**

<i>Demographics</i>		
<i>Age (years)</i>		
	<b>Mean</b>	61.1 ± 10.6
	<b>Median</b>	60
<i>Language</i>		
<b>English</b>	<b>N</b>	38
	<b>%</b>	100%
<b>Spanish</b>	<b>N</b>	0
	<b>%</b>	0.0%
<i>Gender</i>		
<b>Female</b>	<b>N</b>	16
	<b>%</b>	84.2%
<b>Male</b>	<b>N</b>	3
	<b>%</b>	15.8%
<i>Race/ Ethnicity</i>		
<b>White</b>	<b>N</b>	10
	<b>%</b>	52.6%
<b>Black</b>	<b>N</b>	9
	<b>%</b>	47.4%
<i>Education</i>		
<b>Less than high school</b>	<b>N</b>	4
	<b>%</b>	21.1%
<b>High school</b>	<b>N</b>	7
	<b>%</b>	36.8%
<b>More than high school</b>	<b>N</b>	8
	<b>%</b>	42.1%

**Table 38. Mary Mahoney survey results**

<i>Question</i>		<i>Date</i>		
		<b>Nov/Dec</b>	<b>March</b>	<b>May</b>
<i>Before Fresh Rx, you worried about whether your food would run out before you got money to buy more.</i>				
<b>Often</b>	<b>N</b>	17	4	8
	<b>%</b>	50.0%	18.2%	38.1%
<b>Sometimes</b>	<b>N</b>	11	14	10
	<b>%</b>	32.4%	63.6%	47.6%
<b>Never</b>	<b>N</b>	6	4	3
	<b>%</b>	17.6%	18.2%	14.3%
<i>Before Fresh Rx, you ran out of food and did not have money to buy more.</i>				
<b>Often</b>	<b>N</b>	13	5	5
	<b>%</b>	36.1%	23.8%	23.8%
<b>Sometimes</b>	<b>N</b>	16	10	11
	<b>%</b>	44.4%	47.6%	52.4%
<b>Never</b>	<b>N</b>	7	6	5
	<b>%</b>	19.4%	28.6%	23.8%
<i>Before Fresh Rx, how easy was it to get fresh fruits and vegetables?</i>				
<b>Easy</b>	<b>N</b>	3	3	0
	<b>%</b>	8.6%	13.6%	0.0%
<b>Somewhat easy</b>	<b>N</b>	10	6	6
	<b>%</b>	28.6%	27.3%	28.6%
<b>Hard</b>	<b>N</b>	16	12	14
	<b>%</b>	45.7%	54.5%	66.7%
<b>Very hard</b>	<b>N</b>	6	1	1
	<b>%</b>	17.1%	4.5%	4.8%

<i>Question</i>		<i>Date</i>		
		<b>Nov/Dec</b>	<b>March</b>	<b>May</b>
<i>Before Fresh Rx, did you ever attend a nutrition class?</i>				
<b>Yes</b>	<b>N</b> <b>%</b>	12 33.3%	7 31.8%	7 33.3%
<b>No</b>	<b>N</b> <b>%</b>	23 63.9%	15 68.2%	12 57.1%
<b>Not sure</b>	<b>N</b> <b>%</b>	1 2.8%	0 0.0%	2 9.5%
<i>Today, does the food you buy last until you have money to get more?</i>				
<b>Often</b>	<b>N</b> <b>%</b>	10 27.8%	12 54.5%	7 33.3%
<b>Sometimes</b>	<b>N</b> <b>%</b>	20 55.6%	10 45.5%	13 61.9%
<b>Never</b>	<b>N</b> <b>%</b>	5 13.9%	0 0.0%	1 4.8%
<b>Do not know</b>	<b>N</b> <b>%</b>	1 2.8%	0 0.0%	0 0.0%
<i>Today, how easy is it to get fresh fruits and vegetables?</i>				
<b>Easy</b>	<b>N</b> <b>%</b>	6 16.7%	5 22.7%	5 23.8%
<b>Somewhat easy</b>	<b>N</b> <b>%</b>	20 55.6%	10 45.5%	10 47.6%
<b>Hard</b>	<b>N</b> <b>%</b>	8 22.2%	7 31.8%	6 28.6%
<b>Very hard</b>	<b>N</b> <b>%</b>	2 5.6%	0 0.0%	0 0.0%

<i>Question</i>		<i>Date</i>		
		<b>Nov/Dec</b>	<b>March</b>	<b>May</b>
<i>Today, which describes the food in your home?</i>				
<b>Enough</b>	<b>N</b> <b>%</b>	14 38.9%	8 36.4%	12 57.1%
<b>Often enough</b>	<b>N</b> <b>%</b>	14 38.9%	10 45.5%	8 38.1%
<b>Rarely enough</b>	<b>N</b> <b>%</b>	3 8.3%	2 9.1%	1 4.8%
<b>Not enough</b>	<b>N</b> <b>%</b>	5 13.9%	2 9.1%	0 0.0%
<i>Today, which describes the healthy food in your home?</i>				
<b>Enough</b>	<b>N</b> <b>%</b>	9 25.7%	7 31.8%	10 47.6%
<b>Often enough</b>	<b>N</b> <b>%</b>	15 42.9%	8 36.4%	7 33.3%
<b>Rarely enough</b>	<b>N</b> <b>%</b>	7 20.0%	5 22.7%	4 19.0%
<b>Not enough</b>	<b>N</b> <b>%</b>	4 11.4%	2 9.1%	0 0.0%
<i>Today, do you feel like you know where your next meal is coming from?</i>				
<b>Definitely yes</b>	<b>N</b> <b>%</b>	8 22.9%	4 18.2%	6 28.6%
<b>Yes</b>	<b>N</b> <b>%</b>	23 65.7%	17 77.3%	14 66.7%
<b>No</b>	<b>N</b> <b>%</b>	4 11.4%	1 4.5%	0 0.0%
<b>Definitely no</b>	<b>N</b> <b>%</b>	0 0.0%	0 0.0%	1 4.8%

<i>Question</i>		<i>Date</i>		
		<b>Nov/Dec</b>	<b>March</b>	<b>May</b>
<i>A serving of fresh fruit or vegetables is the size of your fist. Now, how many servings of fresh fruits and vegetables do you eat in a normal day?</i>				
<b>0-1</b>	N %	8 22.2%	8 38.1%	5 23.8%
<b>2-3</b>	N %	20 55.6%	12 57.1%	15 71.4%
<b>4-5</b>	N %	6 16.7%	1 4.8%	0 0.0%
<b>5 or more</b>	N %	2 5.6%	0 0.0%	1 4.8%
<i>How much food from the Fresh Rx food box do you eat?</i>				
<b>All</b>	N %	14 46.7%	9 42.9%	3 15.8%
<b>Most</b>	N %	15 50.0%	11 52.4%	15 78.9%
<b>Half</b>	N %	1 3.3%	1 4.8%	1 5.3%
<i>How much fresh fruit and vegetables from Fresh Rx do you eat?</i>				
<b>All</b>	N %	13 44.8%	7 33.3%	7 36.8%
<b>Most</b>	N %	15 51.7%	14 66.7%	9 47.4%
<b>Half</b>	N %	1 3.4%	0 0.0%	3 15.8%

<i>Question</i>		<i>Date</i>		
		<b>Nov/Dec</b>	<b>March</b>	<b>May</b>
<i>If you do not eat all the fresh fruits and vegetables, why?</i>				
<b>Went bad</b>	<b>N</b> <b>%</b>	8 36.4%	4 33.3%	5 33.3%
<b>Didn't like it</b>	<b>N</b> <b>%</b>	2 9.1%	5 41.7%	4 26.7%
<b>Did not know</b>	<b>N</b> <b>%</b>	1 4.5%	0 0.0%	1 6.7%
<b>Too much</b>	<b>N</b> <b>%</b>	2 9.1%	1 8.3%	2 13.3%
<b>None</b>	<b>N</b> <b>%</b>	9 40.9%	2 16.7%	3 20.0%
<i>How many people in your home eat the food you get from Fresh Rx?</i>				
<b>Do not share</b>	<b>N</b> <b>%</b>	6 20.0%	3 13.6%	*
<b>1-3</b>	<b>N</b> <b>%</b>	18 60.0%	18 81.8%	
<b>4 or more</b>	<b>N</b> <b>%</b>	6 20.0%	1 4.5%	
<i>Where do you get your fresh fruits and vegetables?</i>				
<b>Fresh Rx Distribution</b>	<b>N</b> <b>%</b>	25 83.3%	17 77.3%	*
<b>Food Pantry</b>	<b>N</b> <b>%</b>	5 16.7%	2 9.1%	
<b>Farmer's Market</b>	<b>N</b> <b>%</b>	5 16.7%	2 9.1%	
<b>Grocery Store</b>	<b>N</b> <b>%</b>	19 63.3%	20 90.9%	
<b>Grow your own</b>	<b>N</b> <b>%</b>	3 10.0%	0 0.0%	
*Question not included in May survey				

<i>Question</i>		<i>Date</i>		
		<b>Nov/Dec</b>	<b>March</b>	<b>May</b>
<i>Do you feel you have more control over your health with the tools you learned from Fresh Rx?</i>				
<b>More control</b>	<b>N</b> <b>%</b>	17 58.6%	14 63.6%	15 78.9%
<b>More but not as much as I would like</b>	<b>N</b> <b>%</b>	12 41.4%	7 31.8%	4 21.1%
<b>I do not have any more than I did before</b>	<b>N</b> <b>%</b>	0 0.0%	1 4.5%	0 0.0%
<i>Do you think Fresh Rx improved your health?</i>				
<b>Definitely yes</b>	<b>N</b> <b>%</b>	7 24.1%	6 28.6%	8 42.1%
<b>Yes</b>	<b>N</b> <b>%</b>	22 75.9%	15 71.4%	11 57.9%
<i>How happy are you with Fresh Rx?</i>				
<b>Very Happy</b>	<b>N</b> <b>%</b>	21 70.0%	12 57.1%	11 57.9%
<b>Happy</b>	<b>N</b> <b>%</b>	9 30.0%	9 42.9%	8 42.1%
<b>Neutral</b>	<b>N</b> <b>%</b>	0 0.0%	0 0.0%	0 0.0%

### *Clinical Results*

Mary Mahoney participants had an average increase in BMI of 0.26. More (55.8%) participants increased their BMI throughout the Fresh Rx program, than decreased or stayed the same (42.2%).



There was a reduction in systolic blood pressure from the first to the last systolic measurement. The majority (60.5%) of participants decreased or maintained their systolic blood pressure. However, there was a small increase in diastolic blood pressure (0.9 mm Hg). This is reflected in the 53.5% of participants whose diastolic blood pressure increased over the program.

Hemoglobin A1c (HbA1c) measurements for the 6 Mary Mahoney participants with two HbA1c measurements also saw an average increase by 0.47. Although there was an increase, there were equal amounts of participants whose HbA1c measurements decreased or stayed the same or increased.

**Table 39. Average for first and last clinical measurements, in addition to the average change in these values for Fresh Rx participants from the Mary Mahoney clinic**

	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
<b>First BMI</b>	48	39.23	8.97
<b>Second BMI</b>	43	39.36	8.80
<b>Change in BMI</b>	43	0.26	2.56
<b>First Systolic Blood Pressure</b>	48	136.5	19.3
<b>Second Systolic Blood Pressure</b>	43	134.5	17.8
<b>Change in Systolic Blood Pressure</b>	43	-2.6	17.9
<b>First Diastolic Blood Pressure</b>	48	78.3	11.8
<b>Second Diastolic Blood Pressure</b>	43	78.7	12.6
<b>Change in Diastolic Blood Pressure</b>	43	0.9	11.6
<b>First HbA1c</b>	18	7.03	1.17
<b>Second HbA1c</b>	6	7.47	1.75
<b>Change in HbA1c</b>	6	0.47	1.15

**Table 40. Change in BMI for Fresh Rx participants from the Mary Mahoney clinic**

	<b>N</b>	<b>%</b>
<b>Decrease or no change</b>	19	42.2%
<b>Increase</b>	24	55.8%

**Table 41. Change in systolic blood pressure for Fresh Rx participants from the Mary Mahoney clinic**

	<b>N</b>	<b>%</b>
<b>Decrease or no change</b>	26	60.5%
<b>Increase</b>	17	39.5%

**Table 42. Change in diastolic blood pressure for Fresh Rx participants from the Mary Mahoney clinic**

	<b>N</b>	<b>%</b>
<b>Decrease or no change</b>	20	46.5%
<b>Increase</b>	23	53.5%

**Table 43. Change in HgbA1c for Fresh Rx participants from the Mary Mahoney clinic**

	<b>N</b>	<b>%</b>
<b>Decrease or no change</b>	3	50.0%
<b>Increase</b>	3	50.0%

**Appendix H. Clinical Data for All Fresh Rx Participants**

**Table 29. Average clinical data for all Fresh Rx participants**

Month	BMI			Systolic BP			Diastolic BP			HbA1c		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
<b>October</b>	72	37.01	9.65	72	140.7	20.4	72	80.3	11.5	11	9.00	1.77
<b>November</b>	71	36.87	9.23	72	137.9	14.3	72	79.2	11.8	9	9.33	3.35
<b>December</b>	67	36.97	8.70	68	143.4	22.7	68	80.5	13.8	6	8.33	3.27
<b>January</b>	47	36.41	7.99	48	139.9	22.0	48	79.8	11.5	15	7.93	1.44
<b>February</b>	61	38.63	8.60	63	138.4	18.5	63	79.1	11.1	6	7.00	1.41
<b>March</b>	59	36.26	8.61	57	142.4	16.0	58	84.8	16.0	2	10.50	0.28
<b>April</b>	42	36.48	9.08	41	140.3	16.2	41	80.9	10.3	5	8.72	2.75
<b>May</b>	28	35.13	9.66	30	146.2	21.8	30	85.5	13.7	0	--	--
<b>P value</b>	0.786			0.443			0.086			0.273		

VITA

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