

12-15-2016

Evaluation of the Nutritional Options for Wellness (NOW) Program: Mitigating Cardiovascular Disease and Type 2 Diabetes through Food Pantries

Sarah L. Henning

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Evaluation of the Nutritional Options for Wellness (NOW) Program: Mitigating Cardiovascular
Disease and Type 2 Diabetes through Food Pantries

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A Thesis Submitted to the Graduate Faculty of
GRAND VALLEY STATE UNIVERSITY

In

Partial Fulfillment of the Requirements

For the Degree of

Masters of Public Health

December 2016

Acknowledgements

I would first like to thank my dearest advisor, Dr. Jody Vogelzang, Ph.D., RDN, LD, FADA, CHES of Grand Valley State University for her support and unwavering guidance throughout the entire process of the NOW Program evaluation. I would like to thank Dr. Jeffrey Wing, Ph.D., MPH of Grand Valley State University for contributing to my data analysis for the NOW Program evaluation. Even without being a part of my thesis committee he offered support, guidance, and new data analysis techniques to me. Dr. Wing made sure to let the program evaluation continue to be my own work but directed and guided me in a successful direction whenever he believed I needed help. I would also like to thank the members of my thesis committee, Dr. Lara Jaskiewicz and Emma Garcia for contributing to the process. Without their passionate support and patience, the NOW Program evaluation would not have been successfully conducted. Finally, I would like to thank my friends and dear family for their constant love and support throughout this entire academic journey. Without their love, I would have completed my program evaluation, but I would have been miserable at best. Their unwavering support kept me stable and happy.

Abstract

Individuals with a lower socioeconomic status are at higher risk for chronic disease diagnosis and complications (Gerteis et al., 2014). The NOW Program is a social service program that was created in order to relieve some of the burden placed on these individuals utilizing the charitable food system. The purpose of the study was to perform a quantitative program evaluation on the NOW Program which is administered by pantry coordinating organization. The NOW Program connects chronically ill, low income members of Kent County with local food pantries that offer diet specific food and health education about their specific chronic disease through Spectrum Health Healthier Communities and other community classes. The program evaluation was performed on participants of the NOW Program with a program start date between July 2013 and July 2014. Descriptive statistics and repeated measure linear regressions were performed on the participant study group included in the program evaluation both with and without an adjustment for age of the participant. The NOW Program is helping the NOW Program participants make healthier choices for their disease state. However, it cannot be said that the NOW Program is working in a statistically significant manner. Small sample size due to a lack of data recorded in the pantry network database may contribute to a lack of statistically significant findings. An increase in accountability for the pantry network data base between the pantry coordinating organization and the pantry leaders will be necessary for improvement of the NOW Program. Frequent data cleaning and review of the database will provide more of an understanding of recruitment and retention in the NOW Program.

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Chapter 1

Introduction

It is well documented that the food individuals choose to put into their bodies impacts the overall health status of the population (Crocker, 2010). Poor food choices over time can result in a decrease in the functionality of the human body. In the United States, death and serious complications from acquiring multiple chronic diseases is on the rise especially in lower socioeconomic status (SES) communities (Gerteis et al., 2014). For these individuals there is a lack of accessibility to valid education surrounding the impact that food and nutrition can have on health. This lack of education in combination with low health literacy rates impacts the adherence rates of an individual to chronic disease management.

People who rely on the charitable food system in the United States are facing an even more complex dilemma, as the food given to them from food pantries and food banks could put them at higher risk for chronic disease. The current charitable food system relies on donations of non-perishable items which tend to contain a high sodium and sugar content (Martin, Wu, Wolff, Colantonio, & Grady 2013). There has been an increase in the creation of social service programs to revamp both the charitable food system and the larger food system to work towards the primary and secondary prevention of chronic disease. Even if an individual is educated and has knowledge that poor nutritional choices cause chronic disease and poor health, if that individual is relying on the charitable food system to feed themselves they don't have any control over the food they receive.

Kent County, MI has a network of 75 charitable food pantries that are overseen and coordinated by Access of West Michigan (Access Pantry Network, 2014). This network is designed to relieve some of the burden of food insecurity in the county. Access of West

Michigan also administers the Nutritional Options for Wellness (NOW) Program which connects low SES individuals with chronic illness to local food pantries offering diet specific food items and social programming offering education about the individual's disease. The number of participating pantries ranges from 10 to 12 (NOW Program, n.d.).

The NOW Program is a two-year program with lab values collected before the program, a year into the program, and after completion of the program. An individual must be referred to the program by a medical provider. Once an individual has been referred to the NOW Program by a medical provider, they receive weekly food pick-ups from a local charitable food pantry. The program requires an individual to attend six hours of education in a six month period. These educational hours can range from education and exercise at the food pantry to community programming offered through companies such as Spectrum Health Healthier Communities. Funding for the NOW Program is currently provided by Spectrum Health.

Statement of the Problem

Many healthcare systems in the world are re-vamping how they treat patients (Shortell, Gillies, & Wu 2010). There is an increased focus on preventative medicine and less on reactive costly treatments especially, for chronic disease management (Shortell et al., 2010). This change is financially motivated. Shortell et al. (2010) discussed how the financial burden of the aging population and those being treated for chronic illnesses is straining the system and costing more than preventative medicine. However, this change is slow and the United States is seemingly behind most other leading nations in healthcare and healthcare standards despite its advances in technology (Ridic, Gleason, & Ridic 2012). Coupled with a lagging focus on disease prevention, the United States suffers from a fragmented and unjust food system. The lower SES population of the United States is being targeted by marketing campaigns to purchase low nutrient dense

food due to location or access (Offer, Pechey, & Ulijaszek 2014). Harris et al. (2011) examined individuals without health insurance between the ages of 18-64 and found higher rates of disease were reported for those with a lower SES than those with a higher SES (Harris et al., 2011).

Social services systems that are set into place in order to help relieve the burden of food insecurity are not relieving the negative aspects of obesity in chronic disease development and could actually be aiding in the issue (Martin et al., 2013).

Secondary prevention for chronic disease, such as cardiovascular disease and type 2 diabetes, are the efforts made and strategies used to stop or slow the progression of the disease. The evidence supporting the use of secondary prevention methods to better manage the negative effects of type 2 diabetes and cardiovascular disease has been considered evidence based practice for many years (Ades, 2015). Those programs that include a social construct to improving self-care and the overall health of the household an individual lives in can be more successful (Tausig, 2016). There remains a lack of successful programs available to the large number of individuals with chronic diseases in the United States. In spite of the cost analysis showing the overall success of secondary prevention programs there remains to be a lack of funding for these programs (Ades, 2015).

The current health care system and food system in the United States is not meeting the needs of the individuals in low SES or individuals with cardiovascular disease and type 2 diabetes diagnosis. The charitable food system is attempting to fix the disadvantage but has not provided food options needed to live a healthy life (Martin et al., 2013). The low retention rates in social service programming can create a poor image of secondary prevention programming. Social services secondary prevention programs can be evidence based and are able to show success in the chronic disease populations, yet, these programs are not offered in every

community (Martian et al, 2013).

Background and Need

Currently there is a lack of compliance with disease management interventions in lower SES communities; the NOW Program is working toward correcting this gap (Shaw et al. 2009). The NOW Program and the pantry coordinating organization serve as a liaison between primary care physicians, chronically ill, low income individuals, and local food pantries to help decrease the burden of chronic disease. The NOW Program is aiding in correcting a medical model in the United States that is reactive instead of preventative. In order for the model in the United States to become more of a preventative care model, there needs to be efforts made to close the gap between food insecurity and chronic disease management and prevention. It may take less time for primary care physicians to prescribe medications for chronic conditions but the overall effectiveness of programs that emphasize secondary prevention with nutritional and behavioral changes are key to long-term success (Ades, 2015).

Purpose and Description of the Study

The study evaluated the NOW Program in order to understand the program's effectiveness in decreasing the burden of type 2 diabetes and cardiovascular disease in the lower socioeconomic status participants. The NOW Program exists in order to connect those individuals already diagnosed with a chronic disease, in the lower socioeconomic status with education for management of their chronic disease and diet specific food. Since 2013, when the current pantry coordinating organization began to administer the NOW Program there has been no formal evaluation conducted in order to determine the effectiveness of the program for Kent County.

This study will analyze data from the NOW Program during the timeline of July 2013 to

July 2015. The data will include lab values and class attendance of the NOW Program participants. The evaluation of the NOW Program will benefit the participants of the NOW Program, the pantry coordinating organization, Spectrum Health Healthier Communities, and the NOW Program Pantry entities. The NOW Program evaluation will make a valuable contribution to the current literature surrounding chronic disease and social service programs targeting to prevent them. The research question for the NOW Program evaluation is: Is the NOW Program effective in decreasing the burden of type 2 diabetes and cardiovascular disease in the NOW Program participants?

Chapter 2

Literature Review

The areas of focus for the literature review include the connection between chronic disease and food, retention rates in similar social service programming, and similar programs to the NOW Program that focus on secondary prevention from type 2 diabetes and cardiovascular disease in a lower SES population of individuals. Databases used for the literature review included CINAHL Complete, SAGE Complete A-Z List, ProQuest, and Science Direct. Terms used in the key word search included Diabetes, lifestyle, management, low socioeconomic status, chronic disease, nutrition, cardiovascular disease, food pantry, program evaluation, evaluation, and secondary prevention. Exclusion terms included children or youth. The literature review was conducted in December 2015 and January 2016.

Food and Chronic Disease

The connection between dietary choice and chronic disease has been recognized for many years. The food system and food culture in the United States has led to an increase in chronic disease in the population. The literature review in Area one will cover diet choices in the United States that has increased chronic disease rates in the population and chronic disease management.

The World Health Organization (WHO) has designated guidelines for a healthy diet (Jankovic et al., 2015). A study performed by Jankovic et al. (2015) looked at the correlation between the WHO approved diet and death due to cardiovascular disease. The study included participants from around the world that at baseline were considered free from chronic disease. In follow-up, the study showed an inverse association for Southern European and the United States participants with the Healthy Diet Indicator (HDI) and mortality due to cardiovascular disease

(Jankovic et al., 2015). However, it did not show a significant association in the overall results for HDI and death due to cardiovascular disease, stroke, and coronary artery disease.

Limitations in the study include failing to consider the “underlying food pattern in the studied population” and selection bias in the elderly population leading to underestimation in this population (Jankovic et al., 2015). The WHO guidelines are a structural set of rules for individuals and do not include lifestyle support. A combination of guidelines and lifestyle support can be found in the NOW Program for both cardiovascular disease and type 2 diabetes.

Interventions that focus on nutritional changes and an increase in physical activity for both type 2 diabetes and cardiovascular disease patients remains to be a “key treatment strategy” that has been shown to be successful in both target groups (Evert & Riddell, p. 70, 2015). It is recommended that individuals with type 2 diabetes reduce their energy intake, their food choices. This can be successfully done by decreasing the intake of total fats and saturated fats, sugar, and simple, refined grains and increasing fiber intake and fruits and vegetables (Evert & Riddell, 2015). The importance of effective behavior modification is apparent in Evert and Riddell’s (2015) study through techniques like motivational interviewing, self-monitoring, and individualized goal setting in order to help with long term results. Lifestyle modifications similar to these are still relevant to the population with type 2 diabetes and cardiovascular disease even with the increase in technology and pharmaceutical advances. Even with advances made in technology to increase the success rate of patients meeting normal glucose metabolism while living with diabetes, Gonder-Frederick (2014) still emphasizes the importance of lifestyle choices in these patients due to social support. There is a need for education on lifestyle change and the use of technology so that better management of Type 2 diabetes occurs (Gonder-Frederick, 2014).

The perception these chronically ill patients have of nutritional and behavioral changes was an important factor in the support of long term results of managing their chronic disease. A qualitative study recruited individuals with type 2 diabetes from primary care physicians in 2008-2010 (Wermeling, Thiele-Manjali, Koschack, Lucius-Hoene, & Himmel, 2014). The study focused on individual's perceptions about different types of lifestyle counseling and weight management techniques. The study found that of those interviewed "many considered weight the cause of their condition" and that they were aware of the close connection between being overweight and unhealthy eating (Wemeling et al., p. 3, 2014). These participants found it difficult to put the nutritional recommendations and weight management techniques into practice (Wermeling et al., 2014). Eating habits that included processed foods with high sugar and sodium content are still seen as favorable in some lower SES communities due to access, heritage, and culture of the community. An increase in education about food and chronic disease could potentially challenge this social norm.

Strong, Lyon, Stern, Vavasour, and Milne (2013) surveyed the Registered nurses in Wellington that were providing the dietary advice to type 2 diabetes patients. Using a 15-item questionnaire, with multiple choice and open-ended questions, the study included 151 members of the Wellington Division of the New Zealand College of Practice Nurses in 2007 (Strong et al., 2013). The study found that in 2007 most of the education being done on dietary advice for type 2 diabetes patients was being conducted by nurses with an average time range of 4 to 15 minutes (Strong et al., 2013). The question that arises from this survey is whether this time with a nurse is enough for an effective behavioral change in a type 2 diabetic patient. With the limited amount of time available to work with these patients there is not an effective way to set up goals for behavioral and lifestyle changes. The NOW Program offers a similar supplemental education

tool with an additional six hours of education required during a six month portion of the program.

The NOW Program offers many education and nutritional opportunities to a population that often finds itself food insecure and stressed. The burden and stress of food insecurity is disproportionately impacts those individuals in the United States that are at the highest risk for being overweight and obese (Larson & Story, 2011). Larson and Story (2011) reviewed the connection between an individual being food insecure and the potential risk of that individual becoming obese. Larson and Story (2011) also reviewed how use of government and charitable food system could be connected to obesity within the population. The review found that there were mixed connections in children and men between an individual being food insecure and the risk for becoming obese, while the connection between these two variables was significant in women. Women who were experiencing or had experienced food insecurity were more likely to be obese (Larson & Story, 2011). The review calls for more research to be done between the connection of food insecurity and obesity in low income populations. This relationship—between a) food insecurity and utilization of the emergency or charitable food system and b) the risk of becoming obese or burdened with a chronic disease—will be developed further in the next section of the literature review.

Retention and the Referral Process

This section of the literature review looked at the poor retention in social service programming similar to that of the NOW Program. Programming with similar referral processes and effectiveness of the program to help the intended participants will be the focus of the literature review.

During the evaluation timeline the NOW Program referrals were solely from primary care

physicians. Social service programs that are based on referrals from physicians that do not directly administer the program can have low retention and success rates (Toth-Capelli, Brawer, Plumb, & Daskalakis, 2012). Once a medical provider refers an individual to a program, they may not see the individual again until many months to a year later (Toth-Capelli et al., 2012). By the time the medical provider sees the individual again they could have already dropped the program for many reasons. Toth-Capelli et al. (2012) found that dropout rates were higher for programming that was solely based on primary care physician referrals and dropout rates decreased when voluntary referrals to programs were accepted. Other factors that influenced dropout rates and effectiveness of the social service programming according to Toth-Capelli et al, (2012) included age of the participants, physical limitations to attendance, lack of social support, and whether or not the participants had young children living in the household. A lack of connection with the participants can be caused by the implementation of the program and administration of the study being handled by two parties. Toth-Capelli et al. (2012) recommended weight management program similar to their study should address social and personal barriers in order to be successful.

Programs that incorporate differing recruitment methods instead of solely relying on primary care physician referrals show an increased likelihood of success (McCann, Ridgers, Carver, Thornton, and Teychenne, 2013). However, not all social service programs structured like the NOW Program are reporting on the retention and recruitment strategies. This could be due to fear of losing funding with poor outcomes for recruitment and retention. However, this lack of reporting could be hindering the success for the target population. Health promotion organizations could learn from one another in order to help create an extremely successful program with better retention and recruitment with the target audience.

The NOW Program recruits member of Kent County with low SES. The connection between SES and non-communicable disease has been a public health topic as the rates of death from non-communicable diseases now outweigh those of communicable disease in the United States could be connected to the lack of self-care resources available to low SES individuals (Tausig, 2016). Sommer et al. (2015) found evidence that living in a lower SES community increases the risk of chronic disease. Another study that considered the same concepts was done by Kennedy, Paeratakul, Ryan, and Bray (2007). This study was analyzing personal interviews that focused on self-reported rates of chronic disease in the different SES communities (Kennedy et al., 2007). Kennedy et al. (2007) found results of higher rates of all chronic disease types except for osteoporosis and cancer in the lower SES communities. This qualitative study offered insight as to social and cultural barriers in low SES communities leading to the increase in chronic disease diagnosis.

An assessment in Canada done by Tse and Tarasuk (2008) looked at the meal programs and the composition of those meals for the homeless in the Toronto community. There are many similarities between these charitable meal programs for the homeless in Canada and the charitable food pantries that service the NOW Program. Both programs rely on purchased food as well as donations in order to provide enough food for the program participants. The use of food donations can be fiscally responsible for the organization but creates a lack of control over the quality of food they are able to provide for the program's participants. The populations of individuals utilizing both of these programs have similar characteristics making this study important to consider while doing a review of the available literature. Tse and Tarasuk (2008), found that most of the meals provided in the meal programs in Toronto did not meet the recommended daily requirements for adults. When the food available for the meal program was

increased this helped to close the gap of a lack of nutrients in the meal; however, there was still a noticeable lack of available vegetables and dairy in these programs (Tse & Tarasuk, 2008). The challenge of keeping healthy, fresh produce available for participants could likely be a barrier to the NOW Program food pantries. Canada is not the only country considering the nutritional status of the food they are providing their homeless population. A study done in the United Kingdom (UK) by Frost, Pelham-Burn, Russell, and Barker (2014) looked at the quality of food provided to homeless and vulnerable adults in the food aid organization. The study found similar results with those individuals being served by the food aid organization had a diet high in sugar and fat and low in fresh fruits and vegetables (Frost et al., 2014). This study cited a limitation to any changes to the food aid organization due to the food preferences and low adherence rate of new food choices in the population served (Frost et al., 2014). Food preference data can vary depending on location and culture of the food system and may be different for NOW Program participants in Kent County, MI.

Utilizing different techniques and strategies for the NOW Program can increase success of recruitment and retention. A lack of sharing information between social service programming due to a fear of defunding creates a barrier for the participants of these programs. An effective referral process is necessary for the success of the NOW Program but a retention plan or process is also important in order to see overall success in the NOW Program participants.

Secondary Prevention Methods

The NOW Program uses the trans theoretical model of change, utilizing both behavioral and nutritional modifications in order to better manage symptoms of chronic disease in low income patients (Prochaska, DiClemente, & Norcross, 1992). This section of the literature review will consider other programs in the United States that are similar to the NOW Program in

the likeness that they use secondary prevention methods to help decrease the burden of chronic disease.

Pasos Adelante is a chronic disease prevention program encompassing both behavioral and nutritional initiatives like the NOW Program. The study was conducted in a quasi-experimental design in 12-week sessions and analyzed effectiveness of the program to help control and prevent chronic disease complications, such as nerve damage, visits to the emergency room, and kidney damage in the target population (Staten et al., 2012). Results of the study showed improvements in values from baseline to post-test and no significant change in values from post-test to follow-up. Even after program completion the participants were able to perform chronic disease maintenance. This program successfully utilized the trans theoretical model of change for sustained maintenance of behavioral change (Prochaska, 1992).

Another study that focused on reducing chronic disease with social service programming, focused on decreasing diabetic risk factors in participants by offering weekly screenings, weekly exercise classes, weekly weight check-ins (optional), and nutritional education provided by a registered dietitian. Smart phone apps helped with recording exercise and calorie intake. The study involved a pre-test and post-test of the participants with 74 successfully completing both (Manry & Peterson, 2013). The study used a pair t-test to analyze the data. Recall bias and poor tracking of the participant's progress throughout the program limitations to the data analysis. The NOW Program addresses the concern of recall bias by having pantry leaders document all classes and weekly food pick-ups in real time with a thorough tracking system in the Pantry Network Database.

A study by Rosland et al. (2014), looked at the influence of social support and health behavior practices in type 2 diabetes patients. The study took place between May 2005 and

December 2006 and included 13,366 type 2 diabetes patients between the ages of 30 to 75 years of age that spoke English, Spanish, Mandarin, Cantonese, and Tagalog. There were 20,188 surveys distributed to participants with a 62% response rate throughout the study. The study found “emotional support and social connectedness were significantly associated with increased adherence to recommended healthful eating regimen, physical activity levels, and checking feet daily but not with adherence to oral diabetes medications, insulin, SMBG, or primary care appointment attendance” (Rosland et al., p. 443, 2014). In conclusion, the study showed support for the cohort model in behavioral change programs with “high levels of social support more clearly associated with adherence to lifestyle behaviors” (Rosland et al., p. 446, 2014). The cohort model can be seen in more current versions of the NOW Program protocols in order to capture the positive effects of social support.

NOW Program participants are referred after they have been diagnosed with cardiovascular disease or type 2 diabetes. Some are even referred after they have experienced complications of chronic disease. Ades (2015), suggested that taking advantage of the “last chance” mindset an individual has when diagnosed could capitalize on the urgency and desire for change and be the best time to offer a lifestyle program (Ades, 2015). However, there is a lack of these lifestyle programs available in the community and some doctors may find it easier to prescribe glucose lowering pharmaceuticals than health coaching. The Look AHEAD study unfortunately did not show strong evidence for lifestyle programs leading to full remission from the disease. However, if the data is broken down in the Look AHEAD study there is evidence to show that if a person enters a lifestyle program shortly after being diagnosed with type 2 diabetes there is an increased likelihood of that individual achieving partial remission (Ades, 2015). A separate study done on a smaller scale in a non-randomized group showed that “one-year

remission rate for recent onset type 2 diabetes may be higher than” what was shown in the Look AHEAD study (Ades, 2015). Instead of promoting an “easy fix” with prescription drugs Ades (2015), promotes the increase in prescribing lifestyle programs to recent onset patients with type 2 diabetes similar to cardiac rehabilitation or the NOW Program.

Some of the struggles of these programs are derived from healthcare professionals. A study done by Lee and Begley (2012) looked at the perceptions physicians have towards these chronic disease management programs. Doctors with a specialty focus and those in a competitive market saw the programming with a more positive view (Lee & Begley, 2012). Doctors with a higher percentage of patients who have chronic disease were more favorable towards the disease management programs (Lee & Begley, 2012). The patient’s perception of how their physician feels about the program can impact the success rates an individual in a nutritional chronic disease management program. The NOW Program participants are only referred to the program by physician’s offices. This makes the referring physician’s opinion of the NOW Program an important one for the success of program.

Secondary prevention methods for chronic disease management and the programs utilizing this concept have been under evaluation since their creation. The long standing method of using nutritional and behavioral changes as a successful way to manage individual’s chronic disease symptoms after diagnosis can successfully change the course of an individual’s chronic disease journey and prolong the lifespan. The programs mentioned above are all similar to the NOW Program as they are using nutrition and behavioral change to better the lives of those individuals in a specific target population. Their successes and shortcomings were important to consider when the evaluation of the NOW Program occurred.

Summary

The food and food culture in the United States can be related to the high number of individuals living with chronic disease in this country. The charitable food system set in place needs to undergo an intense cleanse of nutrient poor foods within the food pantries in order to better serve low income individuals with chronic diseases and prevent chronic diseases in the first place for these individuals. Similar programs to the NOW Program have been successfully implemented in the United States to better serve this population and their dietary needs to better manage type 2 diabetes and cardiovascular disease. Successful referral and retention techniques for social service programming can impact the overall success rate of the program. Proper evaluation of the NOW Program allows the program to more effectively serve the low income, chronically ill individuals of Kent County.

Chapter 3

Methodology

The participants of the NOW Program evaluation included eligible participants of the NOW Program. There was no formal recruitment for participants as the participants were already members of the NOW Program and the Pantry Network Database. The evaluation included participants with a program start date between July 2013 and July 2014 in order to incorporate at least a 1-year lab value comparison to the initial lab values. The referral form to the NOW Program served as a prescription and referral source for the program. Multiple versions of the NOW Program referral form were used between the timeline of July 2013 and July 2015. Upon data collection participants were de-identified and the participant sensitive information remained on the pantry coordinating organization's premises.

Inclusion Criteria:

- Participant of the NOW Program
- Diagnosed with either Type 2 Diabetes or Cardiovascular Disease
- Program start date between July 2013 and July 2014

Exclusion Criteria:

- Program start date before July 2013
- Program start date after July 2014
- Part of the NOW Program before it was administered by the current pantry coordinating organization.
- Not diagnosed with Type 2 Diabetes or Cardiovascular disease but still considered a participant of the NOW Program—COPD, Celiac Disease or Renal Disease

The Pantry Network Database at the pantry coordinating organization was used to gather

the names of the participants and all data points. Access to the Pantry Network Database was limited to the employees of the pantry coordinating organization and pantry leaders or directors in Kent County, MI. There was only one location of data collection at the office of the pantry coordinating organization. The data analyzed included lab values, completion of weekly food pickup, and class attendance of the NOW Program participants. Pre-program lab values, one year lab values, and post-program lab values were considered. Class attendance and weekly food pick up data was compared to drop out rates and successful maintenance of the participant's specific chronic disease.

Data collected included:

Initial lab values and anthropometric measures

- Age
- Referral date
- Program start date
- Weekly food pick up completion dates
- Class attendance
- One-year lab values and anthropometric measures
- Post program lab values and anthropometric (two year lab values and anthropometric measures)

Lab Values and Anthropometric Measures included:

- Height
- Weight
- Body Mass Index (BMI)
- High-density lipoprotein (HDL) levels

- Low-density lipoprotein (LDL) levels
- Total Cholesterol levels
- Hemoglobin A1C (A1C) – for diabetic patients only
- Blood pressure

Upon collection, participant sensitive information was de-identified from the evaluation data. Although the pantry coordinating organization is not a covered entity under the HIPAA regulations all data was collected by the researcher following confidentiality and ethical regulations during the program evaluation. All personally identifiable information collected was permanently encrypted during collection, transmission, and storage.

A report from the Pantry Network Database was created including all households in the database that had received NOW Program services from July 1st, 2013 to June 30th, 2015. The report included 440 households in the Pantry Network Database. The data was then condensed based on inclusion and exclusion criteria. Some households included more than one NOW Program participant and were given different participant de-identification codes in order to provide appropriate analysis. From the reported created by the database and a database review, data points were collected on an excel spreadsheet. The encrypted spreadsheet was taken to Grand Valley State University for data analysis.

SPSS 20 was used for data analysis. Descriptive statistics were conducted to calculate to describe the study population. Full descriptive statistics can be seen in Table 1. Initial visual inspection of the data was performed in individual spaghetti plots of each of the variables. Spaghetti plots were chosen as an initial inspection of the data due to the appearance of a lack of lab values available across the data and not every individual had multiple lab values recorded.

Variables that were considered for analysis included: BMI (calculated), HDL, LDL, Total Cholesterol, A1C (for diabetic participants), systolic blood pressure and diastolic blood pressure.

Repeated measures linear regression for each variable was performed separately. First, the regressions were performed without adjusting for any covariates. Then, the regressions were repeated after adjusting for initial age of the participant. Biological sex was not taken into account during analysis due to the fact that information was not provided on the referral form. The estimate of interest was per visit outcome was calculated and recorded for all variables. In other words, the amount of change to each of the variables between each program visits. These results can be seen in Table 2.

Chapter 4

Results

Figure 1 provides a visual description of the paths participants could have taken during the two-year NOW Program. Estimated dropout rates were determined for when the participant stopped showing up for weekly food pick-ups and educational opportunities. This does not include if a participant did not successfully meet food pick up requirements and class requirements for a six-month time period. There were cases where the requirements were not recorded as being successfully met but the participant was allowed to continue into the next six-month time period of the program. The number of participants eligible to participate in the study was 127 individuals. Over half of the participants had initial lab values recorded in the Pantry Network Database (n=68). Lab visit one occurred ideally one year after the program began. Eighteen participants had this lab value appropriately recorded in the database, making the completion rate for lab one 14.2%. While seven participants had a final value or lab value two recorded in the database, making a 5.5% completion rate for lab two of the initial participants. Eighty-six participants dropped out or stopped showing up for food pick-ups and class during year one. This was 67.7% of the original participants referred to the program and considered in the evaluation. An additional nine dropped out in year two, making the drop out total for the two-year program 96 members out of the 127 or 75.6% of the original participants. This does not include members who continued to participate in the program even after not meeting program requirements. There were six individuals who were still in progress with completely their program. The first six month session of the NOW Program had the highest dropout rate.

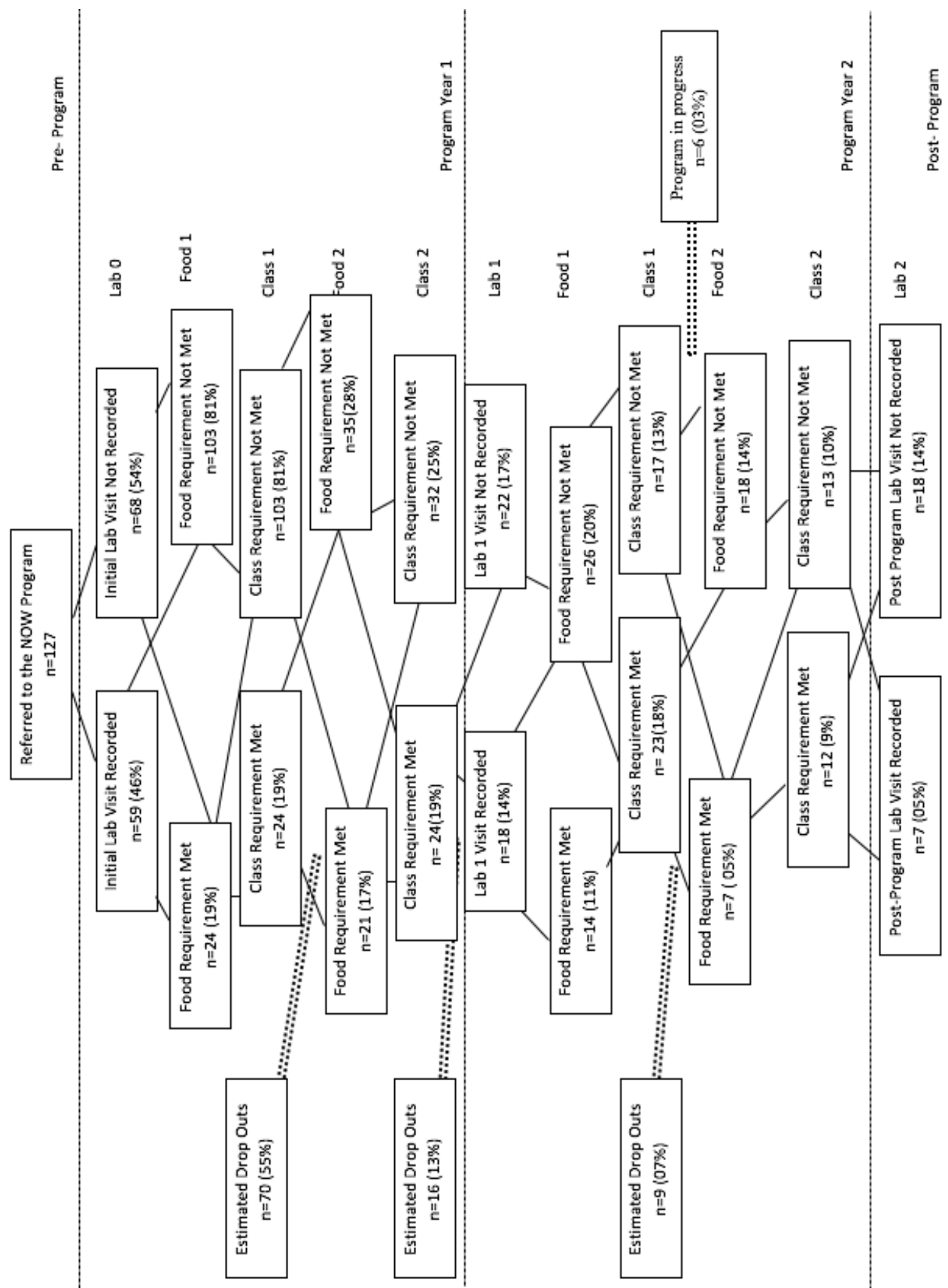


Figure 1. Participant flow chart. Flow chart for food pick up, educational and lab value requirements.

Table 1		
Descriptive statistics for study population and ideal or healthy individual.		
	Average	Ideal/Healthy
Age	52.37	N/A
BMI	38.32	<25
HDL	47.77	>50 Male or >60 Female
LDL	107.38	<140
Total Cholesterol	196.09	<170
A1C	9.22	<5.7
SBP	130.69	<120
DBP	78.96	<80

Table 1 shows the descriptive statistics used to describe the study population at the initial visit of the NOW Program. Averages of each of the variables can be seen in the table. This tables shows a representation of where the study population started from in the NOW Program to further help understand the success of the program. The last column of the table shows the ideal numbers for each of the variables for a healthy individual.

Table 2				
Results from the repeated measure linear regression				
	Unadjusted		Adjusted for Age	
Outcome/Biologic Measure	per visit change	p-value	per visit change	p-value
BMI	-0.31(0.51)	0.55	-0.28(0.52)	0.59
HDL	-0.70(1.46)	0.63	-0.72(1.46)	0.62
LDL	-8.36(5.62)	0.14	-8.31(5.64)	0.15
Total Cholesterol	-9.29(7.52)	0.23	-9.02(7.50)	0.24
A1C	-0.16(0.29)	0.58	-0.16(0.29)	0.58
SBP	3.09(3.91)	0.43	2.40(3.97)	0.55
DBP	-0.60(2.01)	0.77	-0.73(2.02)	0.72

Table 2 shows the estimated fixed effects of change for each variable in between each visit of the program. Between any two lab visits of the program, LDL cholesterol was estimated to decrease by 8.36 and Total Cholesterol was estimated to decrease 9.29. The BMI was estimated to decrease by 0.31. There is no statistically significant change in any of the variables considered.

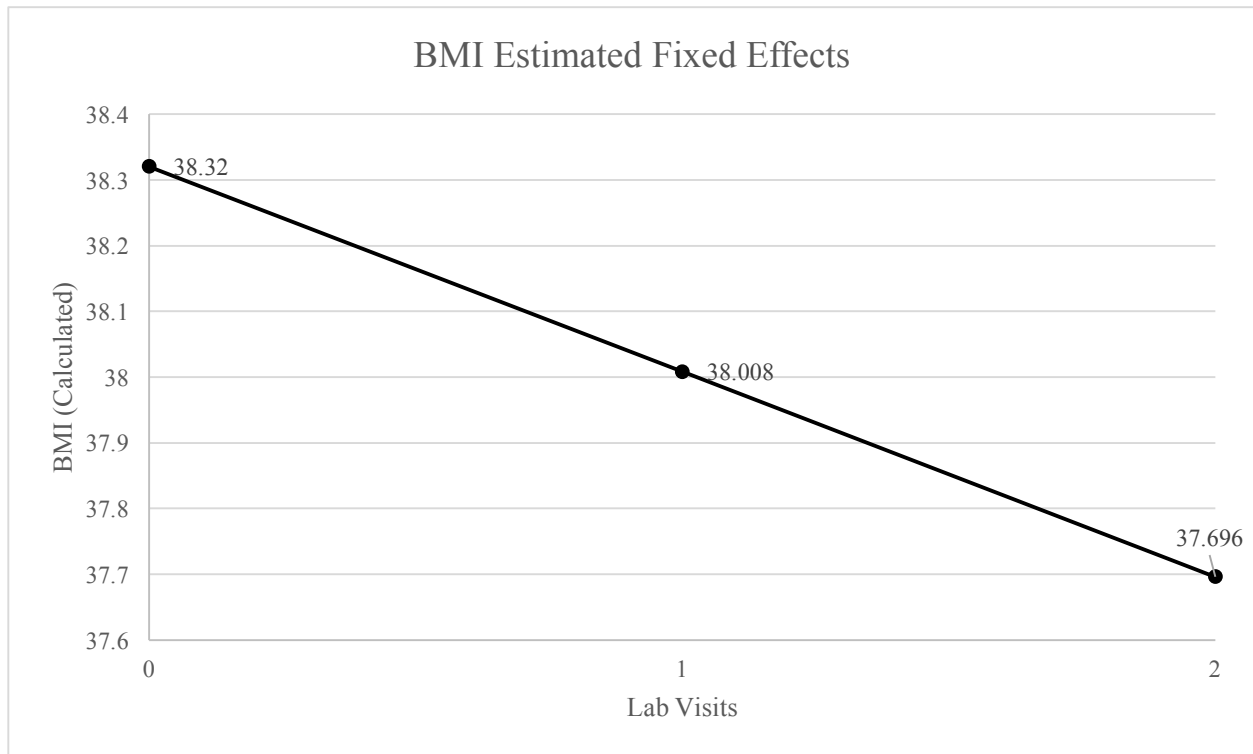


Figure 2. BMI estimated fixed effects per lab visit graph. This figure shows the estimated change to a participant's BMI between any given lab visit.

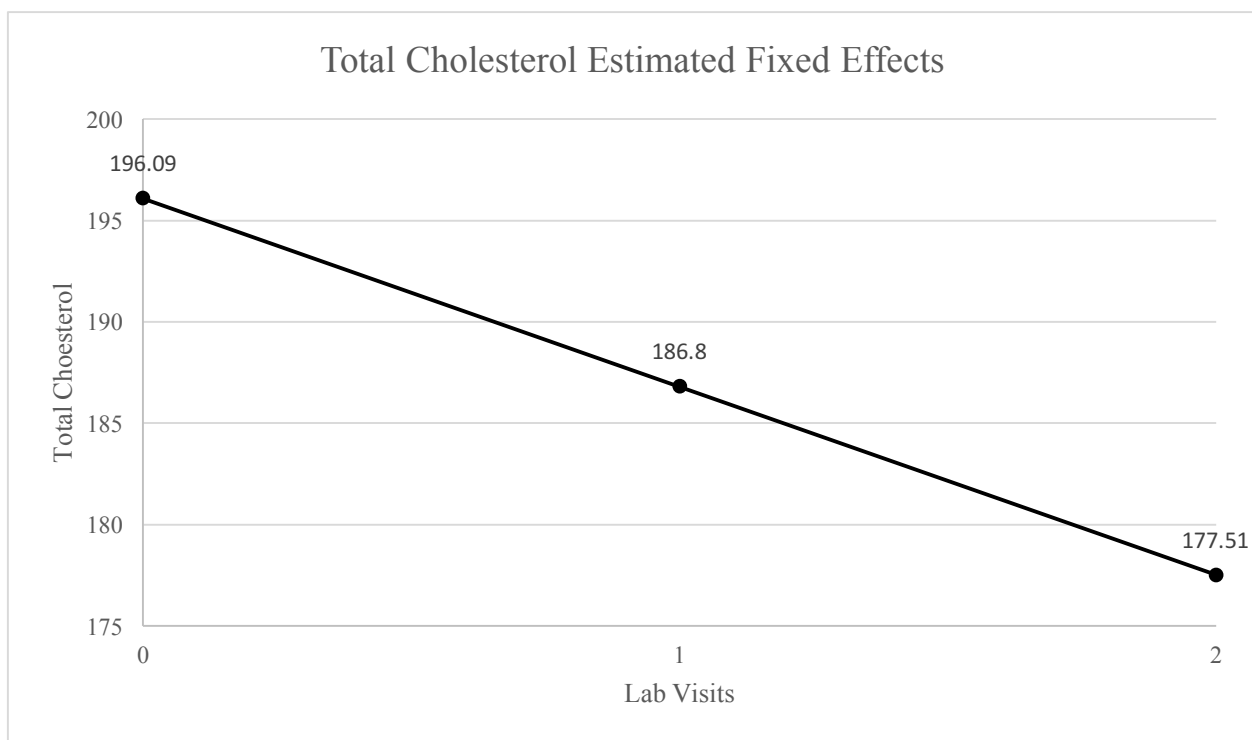


Figure 3. Total cholesterol estimated fixed effects per lab visit graph. This figure shows the estimated change to a participant's total cholesterol between any given lab visit.

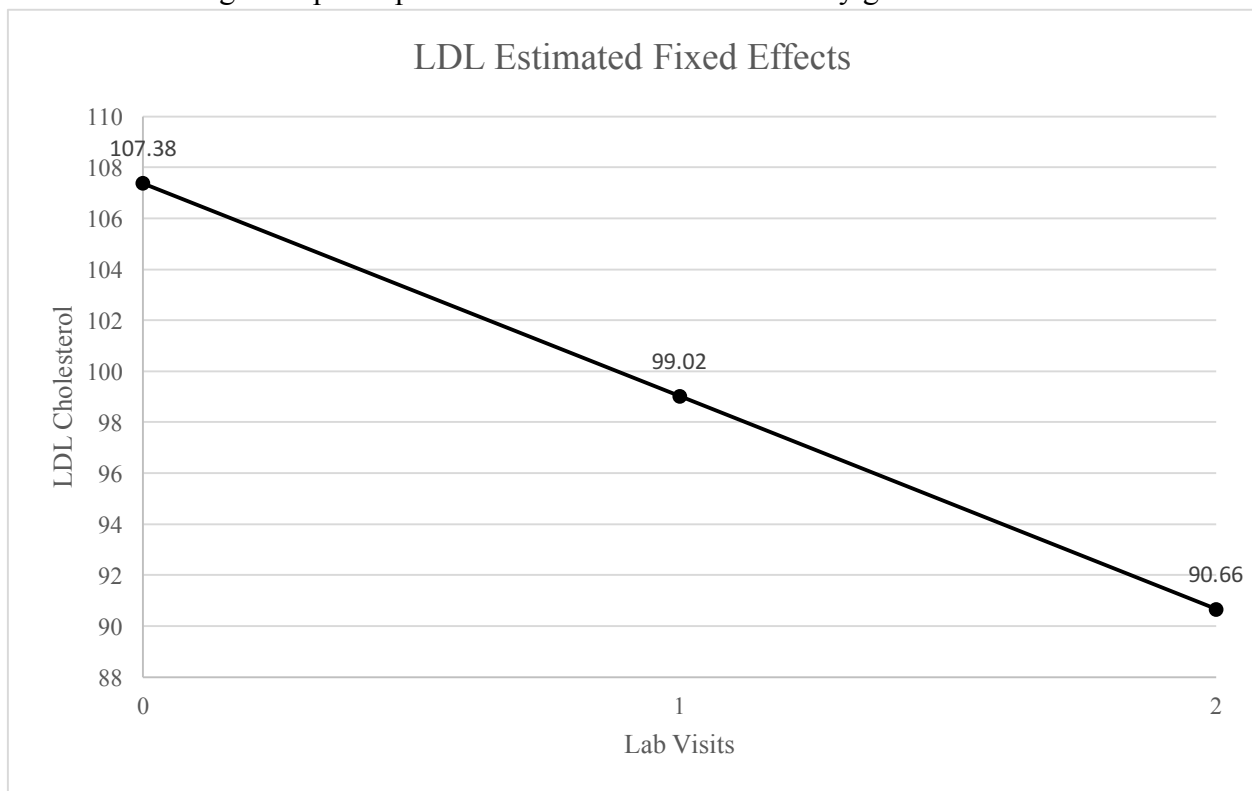


Figure 4. LDL estimated fixed effects per lab visit graph. This figure shows the estimated change to a participant's LDL cholesterol between any given lab visit

Figures 2-4 are visual representation of the data found in table 2. Figure 2 shoes the estimated decrease of 0.31 kg/m^2 in a participant's BMI between each of the lab visits during the NOW Program. Figure 3 shows the estimated decrease of 9.29 mg/dL in total cholesterol between each lab visit of the program. Figure 4 shows the estimated decrease of the LDL cholesterol by 8.36 mg/dL between each of the lab visits.

Chapter 5

Discussion

Acquiring multiple chronic disease states and complications, some even resulting in death, is on the rise for the lower socioeconomic status population in the United States (Gerteis et al., 2014). Programs created to combat these complications and disproportional deaths require evaluations periodically for increased recruitment and retention rates. Differing referral processes, methodology, and follow up protocols all impact success rates of the programs in different communities. The purpose of this quantitative study was to perform a program evaluation of the NOW Program. The analysis included descriptive statistics and repeated linear regressions of lab values for the NOW Program participants collected from the pantry network database. Successful food pick-ups and class attendance was considered during the evaluation. This evaluation of the NOW Program will be shared with the pantry coordinating organization for consideration and implementation into the existing program.

Program requirements include three lab value reports, weekly food pick-ups, and attending six classes during a six-month time period. All requirements should be recorded by a food pantry employee at one of the NOW Program pantry sites in the Pantry Network Database. An overall view of the program participants NOW journey can be viewed in Figure 1. There is a decrease in the number of participants with labs that were obtained and successfully recorded in the data. Sixty five participants were recorded for having the initial lab values out of the 127 eligible program participants dropping down to seven post program lab values. There are low lab value recordings for the initial lab values even though lab values are required for program acceptance and included in the referral form. This lack of recording, especially for the initial lab

values could be due to a lack of accountability and follow through by the pantry leaders. Increased education for pantry employees regarding the importance of lab value records and lab value changes on the program's success and ultimately program funding is necessary. Accountability for data entry and data cleanliness should be made a top priority by the pantry coordinating organization and pantry leaders. Periodic database cleaning and reviews should be made by a designated employee of the pantry coordinating organization.

The descriptive analysis found in Table 1 provides an overall picture of the program participants included in the NOW Program evaluation. The population considered was expected to be unhealthy, obese, and to have multiple chronic/comorbidities (Disano, Goulet, Muhajarine, Neudorf, and Harvey, 2010). The average BMI of the participant group was 38.32 kg/m² placing them in the morbidly obese category. The average HDL, LDL and Total Cholesterol lab values were 47.7 mg/dL, 107.38 mg/dL, and 196.09 mg/dL respectively. Average HDL of the group is considered and not a protective lab value because it is below 40 mg/dL (Robinson & Stone, 2015). LDL and Total Cholesterol averages of the group are not within the healthy range (Robinson & Stone, 2015). The A1C average of diabetic participants was 9.22%, which is well above the level to be considered diabetic. All of these averages were poor compared to the general population and some (BMI and A1C) could be considered extremely poor (Robinson & Stone, 2015). These descriptive statistics provided a basis for further analysis to be conducted. We learned our participant group for the program evaluation was chronically ill with one or more chronic diseases, type 2 diabetes and cardiovascular disease being the focus of this study.

Table 2 includes the results from the repeated measures for linear regression with an adjustment for age of the participant at the lab collection or referral date. The estimated fixed effects of the variable between each visit all decreased except for systolic blood pressure which

was estimated to increase by 3.09 in between any given two visits. Some of the different variables collected for the program evaluation could vary from minute to minute and can be influenced easily by confounding factors to the NOW Program. For example, systolic blood pressure could increase or decrease in a participant within minutes of testing. The procedure for taking an accurate blood pressure could be different at different referring locations. Inaccuracies could occur due to technology errors or human error depending on the collection method. Due to the fact that referring sites are collecting the lab values, the pantry coordinating organization does not have control over the collection method for the NOW Program lab data at this time.

The fact that all of the variables aside from systolic blood pressure was estimated to decrease between each lab visit show the data magnitude and direction are ideal for a successful program. However, none of the variable changes show a statistically significant change over the course of the program or between any two lab values. This is shown by the p-values in Table 2 for each of the variables. The lack of evidence supporting a statistically significant change in the variables could have been caused by the small sample size of data available in the pantry network database. The number of individuals that had all three (initial, one year, and post program) lab data successfully recorded in the database was seven participants. The small sample size does not provide a solid case for change over time that was created by the program.

The small sample size, differing collection methods, and referral form changes all could have potentially impacted the statistical significance of the program data. The data was analyzed under the premise of changes per lab visit and not necessarily a timeline or changes per year in the program. This lack of consistency could have impacted the statistical significance as well. Even when the most obese participants were removed from the analysis, the effects

estimates did not change significantly. This shows that the results were robust to the outliers in the data. In other words, even including the most obese participants the results were consistent.

Limitations

Although the NOW Program evaluation has provided suggestions to help improve the program, it does have many limitations. The sample size available to analyze from the data in the database was small. The incomplete documentation of the participants eligible for the NOW Program during the time of the program evaluation provided an unsuccessful sample size for a full analysis. This contributed to the non-statistical significance results provided in the data analysis section of the program evaluation.

The only covariate available to the study was age. The age was calculated based on a date written on the referral form for the NOW Program. In some cases, this date was recorded as the date entered into the data base. This did not provide an accurate assessment of the population being studied. The study was limited by the information provided or accurately recorded into the database. Including more covariates in the pantry network database could benefit further studies of the NOW Program. Covariates such as sex, chronic disease state(separate from NOW Program requirements), and income level would help to provide a clear image of the population and help to explain some of the changes or lack of changes in the variables during the course of the program. The covariates could help to provide an explanation to some of the health disparity surrounding low income individuals and chronic disease.

Due to the quantitative nature of the study, a lack of information providing insight to why an individual dropped out or did not successfully complete requirements of the program was unavailable for analysis. Documentation of the NOW Program in the pantry network database

was incomplete in providing qualitative data. Some pantry leaders provided documentation of qualitative data from different participants in comment section of a participant profile but there was not a formal protocol for how to document qualitative information. Data is input into the database by pantry leaders at individual pantry sites and administered by pantry coordinating organization. The disconnection to the program participants and incomplete documentation can be the result of the program and implementation of the program occurring in separate entities.

Future Recommendations

Based on the results and limitations of the study, there are many recommendations for future studies and the NOW Program. First, the limitations mentioned in this study could be eliminated or minimized greatly by incorporating periodic NOW program evaluations and database review/cleaning. An increase in checking the data and an increase in communication between pantry leaders and the pantry coordinating organization will need to occur in order for the database clean up and review to be possible. Accountability for data in the database can be placed on pantry leaders but must be extensively double checked and cleaned by the pantry coordinating organization. The data entry for the lab values, class attendance, and weekly food pick up is essential for further funding of the program and for success of further program evaluations.

The NOW Program and further evaluations of the NOW Program would benefit from a qualitative analysis sections. Qualitative data would be beneficial if gathered from pantry leaders and employees, NOW Program participants, and even the primary care physicians that are referring participants to the NOW Program. The data and analysis could provide insight into the referral process and retention issues for the participants. Further evaluations would be more

complete with the incorporation of a longitudinal aspect to the study. The increased number of years and participants review in an evaluation would increase the sample size and potentially increase the statistical significant findings. This increase in knowledge could provide more information for new protocols for retention and recruitment for the program.

Conclusion

Even with the lack of data points available and the non-statistical significance in the analysis findings, the magnitude and direction of the NOW Program evaluation is headed in the direction of a successful program. The improvement in variables reported shows success in the structure and goals of the program. The NOW Program is working for the participants in Kent County, MI. However, it cannot be said that the NOW Program is significantly working for those participating. A number of reasons could impact the lack of statistical significant data. During the years of focus for this particular program evaluation there were different versions of the referral form utilized by physician offices. A thorough form should be mandatory for all referring offices. Education about the referral process and program procedures should be communicated to all referring physicians' offices. Collection methods for lab values should be consistent. The data within the Pantry Network Database should be periodically cleaned and reviewed for errors and missing data points. Accountability of the lab values in the database should be upheld between pantry leaders and the pantry coordinating organization's employees. Increasing the education for pantry leaders and members about the importance of the lab values to support the success of the program is needed to help improve adherence to data input and accuracy.

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