ABSTRACT

ARE FOOD STAMPS HELPING OR HARMING AMERICANS?

By

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This study analyzes the relationship between participating in the Food Stamp Program (FSP) and being diagnosed with diabetes. Data for this study was based on participants' response to the 2011-2012 California Health Interview Survey (CHIS). This study predicted that participation in the FSP would increase the likelihood for participants to develop diabetes type-2. The variables under investigation in this study consisted of participation in the FSP, previously being diagnosed with diabetes, ability to afford and eat balanced meals, socioeconomic status (SES), and consumption rates of soda and fast food. The results of this study showed statistical significance between FSP participation and being diagnosed with diabetes, ability to afford and eat balanced meals and being part of the lower SES, as well as FSP participation and consumption rate of soda and fast food.

ARE FOOD STAMPS HELPING OR HARMING AMERICANS?

A PROJECT REPORT

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ASP	Assistant Secretary for Planning and Evaluation
BMI	Body Mass Index
CHIS	California Health Interview Survey
EBT	Electronic Benefit Transfer
FPL	Federal Poverty Line
FSP	Food Stamp Program
HHS	Health and Human Services
NHANES	National Health and Nutrition Examination Survey
SES	Socioeconomic Status
SPSS	Statistical Package for the Social Science
USDA	United States Department of Agriculture

CHAPTER 1

INTRODUCTION

The United States Food Stamp Program was established to combat hunger and malnutrition among low-income Americans. However, what started out as a safety net for a struggling population has become a crutch and some would even say a problem to the health of the population it was supposed to benefit as well as the country as a whole. This paper aims to examine the question of whether the Food Stamp Program (FSP) increases the incidence rates of diabetes among the lower socioeconomic status (SES) population. In this study I will use data collected from the California Health Interview Survey to conduct an analysis to determine if being a FSP participant increases the likelihood of developing type-2 diabetes as well as determining if dietary intake and access to fresh and affordable food have an influence for FSP participants. As of the 2008 fiscal year, the FSP served an average of 28.4 million low-income U.S. residents each month at a cost of $37.5 billion (Zhang, Chen, Diawara, & Wang, 2011). Several studies published in recent decades have seen an increase in the incidence rates of obesity among FSP participants. Nicholas's 2011 paper reported that incidence of diabetes is rapidly escalating in the United States despite the Healthy People 2010 goal to decrease the disease and its economic burden. The high rates of obesity raise concerns given that we now know that obesity is associated with other serious health conditions including

diabetes, cardiovascular disease, hypertension, stroke, sleep apnea and non-alcoholic fatty liver disease (Debono, Ross, & Berrang-Ford, 2012). In 2005, it was reported that diabetes alone costs Medicare, the federal health insurance program for the elderly, estimated $71 billion, with the program spending 75% more on elderly diabetics than non-diabetics (Nicholas, 2011). From the research stated above one can conclude that diabetes has become a significant problem in the United States and that there may possibly be a link to the FSP.

The United States Food Stamp Program

To understand the role of the FSP in this multi-factorial problem, is important to understand how the program came to be. The U.S. federal government first provided food assistance to qualifying individuals via food stamps following the Great Depression, from 1939 to 1943 (Grieger & Danzinger, 2011). After a lengthy hiatus the food stamp pilot program was reinitiated in 1961, and the Federal Food Stamp Act was established in 1964; it is also beneficial to note that at this time the program may have been unavailable in certain locations (Grieger & Danzinger, 2011). Kaushal's 2007 paper states that the primary goal of a nutrition program like the FSP at the time was to reduce food insecurity and meet the nutritional needs of low-income families. In order to become eligible for this program a means test was conducted that considered a households assets and its income, although eligible means varied depending on location (Grieger & Danzinger, 2011). In order to be considered eligible for the program household assets had to fall below a modest amount ($2,000 in 2006, $3,000 if the household included an elderly person) which excluded the value of a primary home and vehicle, and if gross income was below 130% of the federal poverty line, as well as if the net income of the household

was below 100% of the poverty line (Grieger & Danzinger, 2011). The popularity of the FSP quickly rose and is continuously growing. Between 1971 and 1974, the FSP served between 9.3 and 12.8 million participants (DeBono et al., 2012). Grieger and Danzinger's 2011 paper reported that there were almost 39 million FSP participants in December 2009. As of 2010, the United States Department of Agriculture (USDA) observed 40.3 million participants (DeBono et al., 2012). With the FSP well established and playing a crucial role in the lives of millions, the U.S. government has to ask itself does the FSP influence the dietary intake of its participants and if the FSP program serves as being beneficial or harmful? It has been disputed that the FSP's goals were set out to provide benefits to lower SES participants by smoothing out household incomes and to free up scarce household resources for other expenses (DeBono et al., 2012). The FSP's benefits could therefore be considered an effective income source and, even in the absence of cash-transfers, could potentially reduce obesity among low income FSP participants as consistent with the income-obesity relationship (DeBono et al., 2012). One assumption is that the FSP influences participants to buy larger quantities of less healthy foods as opposed to fewer quantities of more healthy foods in order to ensure they have enough food to last until the next FSP receipt. It has also been suggested that FSP participants practice a form of cyclic consumption where large quantities of food are consumed at the beginning of the month when participants receive their FSP receipt and famine occurs during the latter half of the month. This imbalance of food consumption can lead to obesity which may lead to diabetes and other chronic health conditions.

Obesity and Diabetes

Obesity is an increasing issue in the United States due to various factors including the quality of food, the amount of food consumed, and the amount of energy utilized from the food consumed. Kaushal's 2007 paper states that obesity poses high risk for serious diet related chronic disease and is the second most common cause of mortality in the country. In 2007-2008, the adult age-adjusted prevalence of obesity was 33.8% in the U.S. population (DeBono et al., 2012). DeBono et al.'s (2012) study stated that an estimate of 32.2% of the adult male population and 35.5% of the adult female population is obese and the prevalence of obesity among men has increased by 4.7 percentage points from 1999 to 2007. Disparities in SES have seen noticeable variations in the prevalence of the obese population. DeBono et al.'s (2012) study reports that low income women are more likely to be obese than their higher income counterparts, although this relationship is less consistent for men. These researchers also state that the USDA's FSP is the largest food assistance program in the United States and has been implicated in exacerbating the health burden of obesity on its participants. Data from the National Health and Nutrition Examination Survey (NHANES) in 1988-1944 reported that the adult FSP participants were significantly more likely to be obese than income eligible non-participants across all age groups (DeBono et al., 2012). Surprisingly, children comprise half of the program recipients but only one-quarter of the total population; the elderly comprise about 9% of the food stamp participants, but make up over 16% of the population (Zagorsk & Smith, 2009). As mentioned earlier obesity can contribute to the development of many serious health conditions including diabetes mellitus, cardiovascular disease, hypertension, stroke, sleep apnea and non-alcoholic fatty liver

disease if untreated (DeBono et al., 2012). Given what medical researchers now know about the link between obesity and diabetes, it may be premature to conclude that the FSP program may be responsible for the escalating rise of diabetes among its participants without understanding the influence the program has on the disease.

Lower Socioeconomic Status and Food Prices

Diabetes is associated with a variety of factors that contribute to the development of the disease. These factors can range from SES, price of the food available, dietary habits, and overall lifestyle, just to name a few. More specifically, the relationship between SES and health for people with diabetes has been emphasized in previous research that has found diabetes outcomes have been attributed to factors such as access to health care, process in which testing has been measured, and overall health behaviors (Gary-Webb et al., 2013). Bowman's 2007 paper reports that from 1990 to 2003, life expectancy at 65 years of age rose from 11.5 to 16.8 years among women in the United States and that this increase was a result of improved health status through better access to health care and drugs, increased food availability, and improved economic conditions. Morland, Wing, Roux, and Poole's 2002 paper reports that over the past couple decades, medical geographers found that physical proximity to a doctor or medical facility affected utilization of health care resources. Yaemsiri, Olson, He and Kerker's 2011 paper attribute the behavioral economic theory of food insecurity pertaining to food purchasing and consumption patterns an attempt to explain the positive association between poverty and obesity and diabetes. It is important to note that Yaemsiri et al. described food insecurity as a situation in which the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or in some

cases uncertain. This insecurity of food may influence individuals to buy foods that are low-cost and energy-dense, which results in poor diet that can cause obesity to develop over time, if the energy in the food is not utilized through daily activities. Cook and Frank's 2008 paper states that food insecurity is a prevalent risk to the growth, health, cognitive, and behavioral potential of America's poor and near-poor children. Members of the lower SES population's food consumption habits are also influenced by the price of food and its overall quality.

As stated earlier diabetes is a chronic health condition that can be treated with a healthy diet and proper exercise much like obesity. One factor to take into consideration is the price of healthy food and the role it plays in contributing to the prevalence of diabetes. The American Diabetes Association recommends that people with diabetes follow a diet that includes carbohydrates from fruits, vegetables, whole grains, legumes, and low-fat milk; containing two or more servings of fish per week (excluding commercially fried fish fillets); limits saturated fat to less than 7% of total calories and dietary cholesterol to less than 200 milligrams per day, and minimizes trans-fat (Anekwe & Rahkovsky, 2014). According to Anekwe and Rahkovsky's 2014 study the cost of diabetes-healthy diet has been identified as a significant barrier to maintaining the diet, particularly among low-income patients. Anekwe and Rahkovsky's 2014 study went on to report that food prices are associated with body mass index, especially among low SES populations and people at risk for being overweight or obese. DeBono et al.'s 2012 paper reports that previous research has concluded that for men, the use of food stamp benefits did not result in an increase in either body mass index (BMI) or the likelihood of being obese; for women however, they concluded that participation in the FSP may increase

BMI and the probability of obesity with some differential effects by race. Several writers have observed that low-income women, including those receiving food stamps are more likely than the rich to be obese and overweight (Alston, Mullally, Sumner, Townsend, & Vosti, 2009). Other research found that the price of low-carbohydrate foods is associated with a higher likelihood of having a diabetes diagnosis and a higher level of medical expenditures among people with type 2 diabetes (Anekwe & Rahkovsky, 2014). Medicare is the federal health insurance program for the elderly reported that in 2005, the program spent 75% more on elderly diabetics than non-diabetics (Nicholas, 2011). The total cost of Medicare spending on diabetes alone in 2005 was estimated at $71 billion (Nicholas, 2011). $71 billion dollars at the cost of a federally funded program is by no means considered a small amount, and has since caught the attention of policy makers who are beginning to realize the influence the FSP might have on poor dietary choices and the impact to the public and private health care spending. Tom Coburn argued at President Obama's 2010 White House Health Summit that the FSP creates diabetes by providing incentives for participants to eat wrong foods (Nicholas, 2011). One factor that is usually overlooked in research regarding the FSP and its impact on its participants is the influence government has on these programs and the environment in which FSP participants are immersed in.

Political Influence

An example of how government decisions impact the mechanisms that influence the health of individuals is a topic that was being debated in 2011 on whether or not people should be able to purchase junk food with food stamps. Ed Cooney, the Executive Director of the Congressional Hunger Center, stated that in 2011 lawmakers of certain

states proposed amendments to the Food Stamp Act that would require an elected official to develop a list of "good foods" and "bad foods" (Cooney & Rubio, 2011). This list would then deny participants of the FSP from purchasing foods that were considered bad (Cooney & Rubio, 2011). Ed Cooney suggested that low-income families purchase the same types of foods at the grocery store as everyone else, and claimed that higher-income families can afford more of the healthiest foods, like fruit and vegetables, whole grains, and low-fat meat and dairy products (Cooney & Rubio, 2011). Mr. Cooney concluded his statements by suggesting that a real solution to the obesity epidemic would be to increase the benefits so that people can afford to buy healthier foods (Cooney & Rubio, 2011). In opposition, California State Senator Michael J. Rubio's bill states that people cannot use their benefits to buy soda, candy, ice cream, muffins, pudding, doughnuts, chips, or other unhealthy foods (Cooney & Rubio, 2011). Senator Rubio goes on to state that the Food Stamp Act that was signed by President Lyndon B. Johnson in 1964, was intended to provide a "nutritionally adequate diet" to Americans who couldn't afford to buy healthy foods themselves (Cooney & Rubio, 2011). Senator Rubio's remarks are reaffirmed by reports stating that the United States spends an average of $7.7 billion each year (in 2011) to treat medical conditions caused by obesity and that by allowing FSP participants to purchase junk foods does not remedy the problem (Cooney & Rubio, 2011). Alston et al. (2009) reports in their research that several studies in recent years have yielded a range of results, but the overall message from the published work is that, compared with non-participants, FSP participants tend to spend more on food, and more on food away from home, and are more likely to be overweight or obese.

As stated earlier, healthy eating habits can help to reduce the risk of developing chronic diseases such as diabetes and obesity; however the influence of political government enforced laws and policies as well as nutrition programs funded by the federal government manipulate the food environment to be perceived as a marketable commodity. It is important to note that food is different from other commodities on the market in that it is explicitly and intrinsically linked to our human existence (Azetsop & Joy, 2013). When examining the link between food accessibility and the influence of government, it is crucial to understand the purpose of government.

The purpose of government is to protect its citizens and to provide law and order. When considering the growing influence government has on the lives of its citizens, especially when we live in a country driven by capitalism, each individual should question the goals of its government and its perspective on what is considered the common good. Azetsop and Joy's 2013 research described the common good as a good which applies to the human community consisting of families, professional groups, social institutions and a national or international community. The need for government and political discourse is necessary to settle issues of how a government should intervene by spending tax dollars to promote the overall health of its citizens. Azetsop and Joy's 2013 paper states that causes of healthy food inaccessibility are essentially structural, and suggests that the inaccessibility to quality food questions the degree of social cohesiveness in the United States. What makes this a challenging topic of debate not only for the United States but every society, is the fundamental cause and distribution of wealth disparity among its population. Azetsop and Joy's 2013 paper describes the concept of fundamental cause as involving resources like knowledge, money, power,

prestige and social connections that determine the extent to which people are able to avoid risks for morbidity and mortality. In the perspective of common good as a good that applies to a human community, this concept of fundamental cause enhances the reasons for poor diet and an individual's inability to access healthy food by observing what puts individuals at risk for diseases caused by diet (Azetsop & Joy, 2013). This is where the government's influence needs to play a role in the inaccessibility of healthy foods because the government is the gatekeeper that allows access to important resources, affects multiple disease outcomes through multiple mechanisms, and consequently maintains an association with disease, when intervening with mechanisms of change such as policies and federally funded programs (Azetsop & Joy, 2013). The government's role in controlling the fundamental cause and distribution of wealth not only influences the health of the population directly through policies but also influences the health of the population by shaping the environment in which its citizens live. The environment is another major factor that contributes to the understanding of the complex multi-factorial equation of determining if the FSP influences the development of diabetes among its participants who are members of the lower SES population.

Environmental Influence

The environment in which people live can have several sub-factors that contribute to the overall health of the individual and can be grouped as environmental factors. The three sub-factors addressed in this paper are food availability, dietary intakes, and attitudes towards food prices. Powell, Han, and Chaloupka (2010) reported that environmental factors are recognized as playing an important role in influencing people's lifestyles and risks for developing obesity. Diet is an important modifiable behavior that

contributes to the positive energy balance that underlies the growing obesity epidemic among adolescents (Powell et al., 2010). A recent literature review highlighted numerous studies reporting that greater access to neighborhood grocery stores was associated with better dietary intake and lower obesity rates among adults (Laska, Hearst, Forsyth, Pasch, & Lytle, 2010). In addition, greater access to convenience stores and restaurants, including fast food, has been associated with less favorable diet quality and increased obesity, although the findings are not consistent (Laska et al., 2010). Galvez et al., 2008 paper reports that a growing body of research has shown that disparities in resources, including food stores, exist at the neighborhood level and the greatest disparities are seen in minority neighborhoods, the same neighborhoods at increased risk of obesity and diabetes. Dietary choices may be influenced by a variety of factors, such as taste, nutrition, weight control, convenience and cost (Morland et al., 2002). Some studies show that cost is the most significant predictor of dietary choices, making healthy eating habits difficult to achieve for the poor (Morland et al., 2002). Throughout the United States, there are varying degrees of the distribution of supermarkets within urban communities lacking access to fresh food (Walker et al., 2011). Farley et al.'s, 2009 study conducted measurements of the length of shelf space used for fruits, vegetables, and snack food items in 419 stores in 217 urban census tracts in southern Louisiana and Los Angeles County. Farley et al.'s 2009 study found that supermarkets offered far more shelf space of fruits and vegetables than did other types of stores, although they devoted more shelf space to unhealthy snacks than fruits and vegetables. After supermarkets, drug stores devoted the most shelf space to unhealthy items (Farley et al., 2009). Another study, conducted by Block, Scribner, and DeSalvo (2004) found that fast-food restaurant

density in shopping areas with 1-mile buffers was independently correlated with median household income and percent of Black residents in the census tract. When examining shopping areas with 0.5-mile buffers, it was found that predominantly Black neighborhoods have 2.4 fast-food restaurants per square mile compared to 1.5 restaurants in predominantly White neighborhoods (Block et al., 2004). The availability of supermarkets and fast-food restaurants greatly influence individual's food price attitudes and dietary practices. Recent research on the food environment has shown that people are sensitive to the relative price of healthier food items (Jetter & Cassady, 2006). Bowman's 2006 study found that women who considered food price very important were more likely to live in low-income, food-insecure households; received food stamps; had low education; rented and did not own homes; and were more likely to be employed as service workers. These characteristics are tied back to the fundamental causes stated in the political influence section.

Understanding the relationship between the FSP and its potential influence on the growing rate of obesity in the United States is tied to lower SES, food prices, political influences, and environmental influences. It is clear to see that this problem is tied to various factors and quick fixes from one factor may not be enough to curtail the incidence of the disease. The question policy makers should be asking is if modifications to the FSP could solve the problem, or if money from tax payers should be directed at remedying other factors involved in the equation such as the price of food or the availability of supermarkets in lower SES areas.

CHAPTER 2

METHODOLOGY

Hypothesis

The purpose of this study is to investigate the question of whether the FSP increases the likelihood of developing diabetes type-2 among the lower SES population. For the purposes of this study diabetes type-2 will simply be referred to as diabetes. This study has multiple hypotheses and they are as follows: (1) Using SES as the independent variable and one's ability to afford and eat balanced meals as the dependent variable I hypothesized that people with lower SES were less likely to have access to healthy food. (2) Next, using a diagnosis of diabetes type-2 as the independent variable and participation in the FSP as the dependent variable I hypothesized that FSP participation was associated with being diagnosed with diabetes type-2. (3) Then using consumption of soda and fast food as an independent variable and participation in the FSP as the dependent variable I hypothesized that when comparing the FSP participant population to itself, participants are more likely to report a consumption of larger amounts of soda and fast food. (4) Finally, I used one's ability to afford and to eat a balanced meal as an independent variable and being diagnosed with diabetes type-2 as the dependent variable and I hypothesized that among the FSP participants only, the mean of people who do not have fresh and healthy food available to them would be more likely to have diabetes than FSP participants who do have fresh and healthy food available to them. In order to test

these hypotheses data was used from the 2011-2012 California Health Interview Survey (CHIS). In order to conduct this research, an analytical approach will be utilized because the variables are nominal, ordinal, and ratio by nature and their source is characterized as a secondary data set.

Overview of CHIS Dataset

The CHIS that will be used in this study is an adult based questionnaire that collects its data from a vast population based survey collecting health data from respondents who are adults 18 or older and of Californian residence. The CHIS is considered to be the largest health information survey that is conducted in the United States. The CHIS is conducted annually by the UCLA Center for Health Policy Research in collaboration with California Department of Health Care Services, California Department of Public Health, as well as other smaller local healthcare organizations. Participants of the CHIS consist of more than 50,000 Californian residents among 58 counties. Participants of the survey are chosen at random to ensure that the sample population accurately reflects California's diverse population without bias. The purpose of CHIS is to collect detailed information on health behaviors, health conditions, disability, health insurance, healthcare utilization, SES, public program participation, housing and more for a variety of age groups (CHIS, 2013). The data collected by CHIS is then used by local, state, and federal organizations. These organizations use the data to produce research that would benefit future generations, conduct analysis that may influence and inform decisions for state and local policies. In addition CHIS data help inform organizations of the current health status of California and the directions it should take as a state to improve the overall quality of health for its residents.

Defining Food Stamp Program Participants

Among California's massive population is a large subgroup of people participating in the FSP also known as CalFresh. Multiple variables under examination in this study are dependent upon defining the FSP participant population. The CHIS 2010-2011 survey identified the FSP participant population by asking the question "Are you receiving food stamp benefits, also known as CalFresh?" which also stated that if needed, say: you receive benefits through an EBT card. EBT stands for Electronic Benefit Transfer card and is also known as the Golden State Advantage Card. This question is listed as QA11_L3 on the CHIS questionnaire.

Defining Lower Socioeconomic Status

Defining lower SES from the CHIS data is a bit more difficult than defining FSP participation or diabetes. The CHIS 2010-2011 survey asks "Including yourself, how many people living in your household are supported by your total household income?" This question is listed as QA11_K15 on the CHIS questionnaire. This question is used to define the number of people dependent upon the participant's household income. After the number of dependents is established, data should be collected on the household's total annual income before taxes. The CHIS 2010-2011 survey asks "What is your best estimate of your household's total annual income from all sources before taxes in 2010?" This question is listed as QA11_K7 on the CHIS questionnaire. Once participants report the number of dependents per household and total annual income before taxes, the participant's data will then be compared to the federal poverty line (FPL) in order to define if a participant is of the lower SES. For this study participants that fell in the 0-99% of the FPL were considered to be of lower SES and compared to participants that

were of 100-199% of the FPL. The FPL is reported by the Office of the Assistant Secretary for Planning and Evaluation (ASPE) which is part of the U.S. Department of Health and Human Services (HHS).

Defining Diabetes

Diabetes type-2 occurs when your body does not produce enough insulin and your body is resistant to the insulin that is produced. The human body uses energy by breaking down the foods we eat into fats, proteins, and carbohydrates. Carbohydrates then break down into glucose. Glucose is used to help the body turn nutrients into energy. Insulin is like the key that allows cells to take in the glucose which allows us to produce energy. The CHIS 2010-2011 survey identified the diabetic population by asking the question "(other than pregnancy, has/have) a doctor ever told you that you have diabetes or sugar diabetes?" This question is listed as QA11_B18 on the CHIS questionnaire. In order to distinguish respondents as type-1 or type-2 diabetes a follow up question is asked which asks "Were you told that you have Type-1 or Type-2 diabetes." This question was listed as QA11_B21 on the CHIS questionnaire.

The Study Under Investigation

Hypothesis 1 predicted that lower SES participants are less likely to be able to afford and eat balanced meals than participants that are not of the lower SES. The first step in testing this hypothesis is to establish the lower SES population as stated earlier. The CHIS survey question QA11_K24 is used to establish if participants had fresh and healthy food available to them. QA11_K24 states "(I/we) couldn't afford to eat balanced meals" and participants were asked "was that often true, sometimes true, or never true for you and your household in the last 12 months?" The independent variable in this

hypothesis is SES and the dependent variable is ability to afford and eat balanced meals defined by participant's response to QA11_K24. A *t*-test will be used to test this hypothesis in order to determine if lower SES influences the availability of fresh and healthy food.

Hypothesis 2 predicted that diagnosis of diabetes type-2 is higher among FSP participants than non-FSP participants. The first step to testing this hypothesis is to identify the lower SES population as defined earlier. The next step is to identify the FSP participants and non-participants of the lower SES population. Once the two groups are established, the mean of participants who have diabetes and are participants of the FSP is then compared with the mean of participants who do have diabetes and are not participants of the FSP. The independent variable in this hypothesis is whether or not the sample population is a participant of the FSP. The dependent variable in this hypothesis is the mean of participants who have diabetes. A chi-square test will be used to test this hypothesis in order to determine if there is a link between FSP participation and likelihood of developing diabetes among the lower SES population.

Hypothesis 3 predicted that among FSP participants they are more likely to consume fast food and soda. First the independent variable is established as consumption of soda and fast foods. Then using the CHIS survey uses questions QA11_C10, and QA11_C11 to determine if participants' diets consisted of more soda, and fast food. The dependent variable in this hypothesis is the mean of the response from CHIS questions QA11_C10, and QA11_C11. A *t*-test will be used to test this hypothesis in order to determine if FSP participants are more likely to consume more soda and fast food than healthy foods like fruits and vegetables.

Hypothesis 4 predicted that among FSP participants those who do not have the ability to afford and eat balanced meals are more likely to have been diagnosed with diabetes than those who do. First step is to establish the FSP participant sample population. Then QA11_K24 is used to identify if they have fresh and healthy food available to them which is the independent variable. Those that do and those that do not have fresh and healthy food available to them will be compared to see which of these two groups has a higher likelihood of developing diabetes which is the dependent variable. A chi-square test will be used to determine if availability of fresh and healthy foods influences the likelihood of having diabetes among FSP participants.

Statistical Analysis

The Statistical Package for the Social Science (SPSS) version 21 was used to conduct the analysis of whether or not FSP participation increases the likelihood of developing type-2 diabetes among the lower SES population. SPSS is analytical software used to sort and calculate data from a vast assortment of statistics. For each hypothesis, a chi-square test was used to analyze the strength of the association between each group. Table 1 summarizes the statistical analysis that will be conducted in this study.

TABLE 1. Proposed Analysis

Hypothesis	Dependent Variable	Independent Variable	Statistical Test
1. Lower SES participants are less likely to be able to afford and eat balanced meals than participants that are not of the lower SES.	Able to afford and eat balanced meals (AM2)	Lower SES (POVLL)	*t*-test
2. Diagnosis of diabetes type-2 is higher among FSP participants than non FSP participants.	Participation in the FSP (AL5)	Diagnosed with Diabetes (AB51)	Chi-square
3. FSP participants are more likely to consume fast food and soda.	Participation in the FSP (AL5)	Consumption of soda and fast food (Soda – AC11, Fast Food AC31)	*t*-test
4. Among FSP participants those who do not have the ability to afford and eat balanced meals are more likely to have been diagnosed with diabetes than those who do.	Diagnosed with Diabetes (AB51)	Able to afford and to eat a balanced meal (AM2)	Chi-square

CHAPTER 3

RESULTS

Descriptive Statistics

The data that was utilized in this study was obtained from the CHIS 2011-2012 Adult Questionnaire. No participants were excluded from the study; in doing so the population of respondents for this data set consisted of 42,935 men and women ranging from 18 to 85 years of age. In this study there were three main independent variables that were used: participation of the FSP, being diagnosed with diabetes, and participant's ability to afford a balanced meal.

According to the data set of the 42,935 participants that responded, 19,879 (46.3%) refused to respond or did not know to the 2011-2012 CHIS survey question QA11_L3 "Are you receiving Food Stamp benefits, also known as CalFresh?" The rest of the participants did respond, leaving a population of 23,056 (53.7%) usable respondents. Of the 23,056 participants that did respond, 2,288 (9.9%) said "Yes" to participating in the FSP, and 20,768 (90.1%) responded "No" to participating in the FSP. The distribution of participants that said "Yes" or "No" to question QA11_L3 of the 2011-2012 CHIS Adult Questionnaire is illustrated in Figure 1.

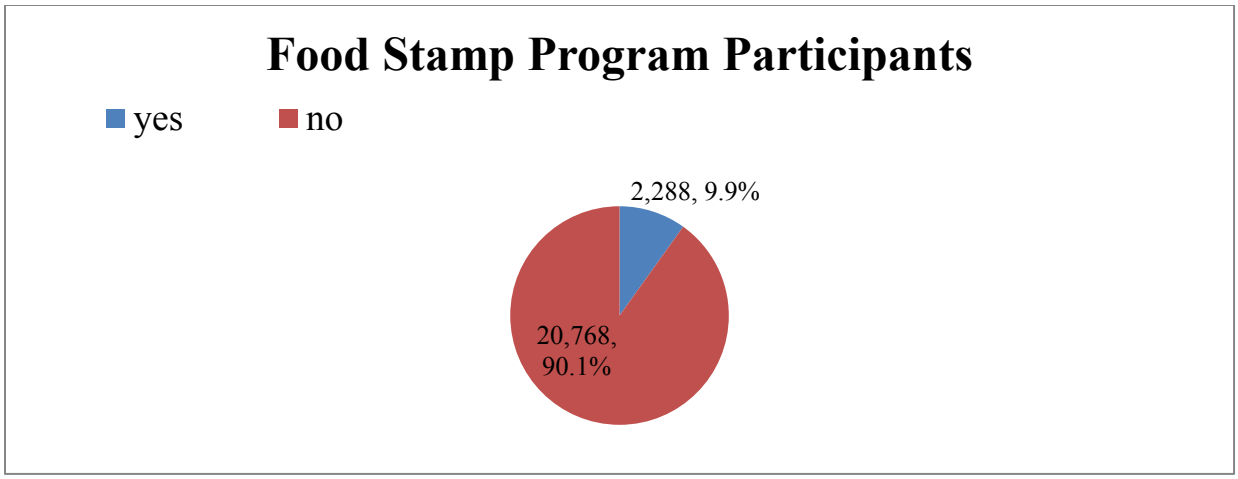

FIGURE 1. FSP participation among 2011-2012 CHIS respondents.

The second independent variable under investigation was the type of diabetes participants had responded to having. There were three categories of diabetes that were reported from participants consisting of diabetes type-1, diabetes type-2, or another type of diabetes. From the total amount of 42,935 participants that responded only 4,701 (10.9%) participants responded to having some type of diabetes, leaving 38,234 (89.1%) of participants to be unused for this variable. The 4,701 (10.9%) of participants were identified by responding with some type of diabetes when asked question QA11_B21 of the 2011-2012 CHIS Adult Questionnaire which asks "Were you told that you had type 1 or type 2 diabetes?" Five hundred and two (10.7%) participants responded with having type-1 diabetes, compared to 4,046 (86.1%) participants that responded with having type-2 diabetes (see Figure 2). Also 153 (3.2%) participants responded with having another type of diabetes that was not type-1 or type-2.

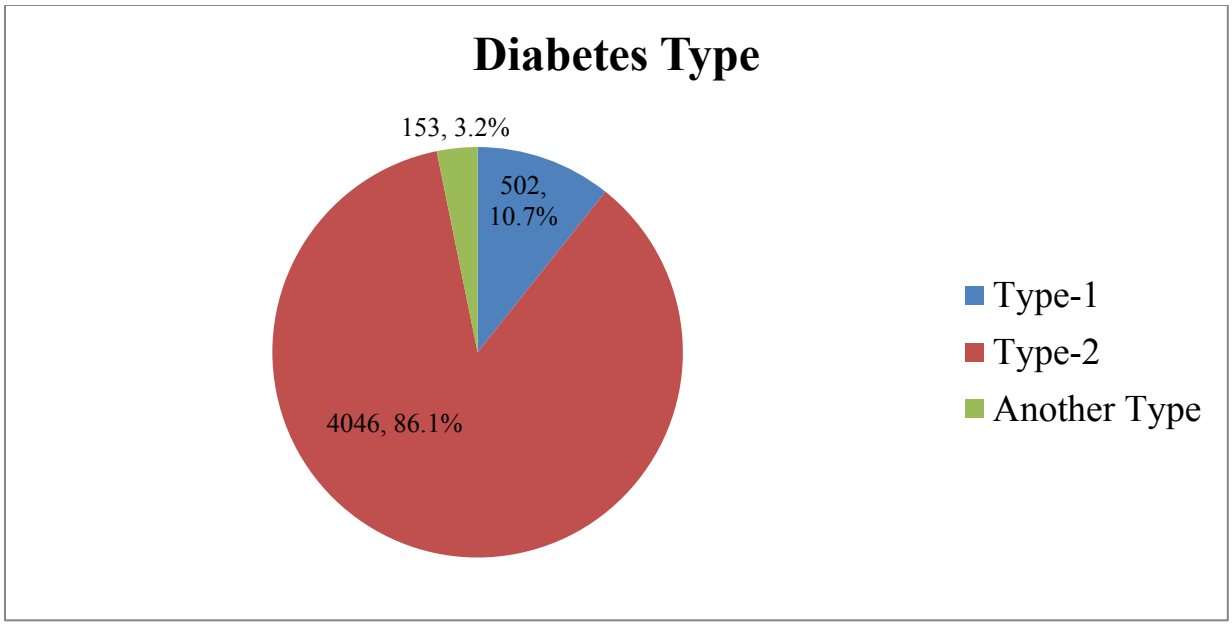

FIGURE 2. Distribution of different types of diabetes.

The last independent variable that was under investigation in this study was the participant's ability to afford a balanced meal. Participants for this variable were selected based on their response of question QA11_K24 of the 2011-2012 CHIS Adult Questionnaire. QA11_K24 asks "The second statement is: {I/WE} couldn't afford to eat balanced meals. Was that often true, sometimes true, or never true for you and your household in the last 12 months?" Participants that responded with the option of "Refused" or "Don't Know" were removed from the sample of participants that were being utilized in the study. The number of participants that responded with often true, sometimes true, or never true was 17,928 (41.8%) leaving 25,007 (58.2%) participants removed from the sample population. Of the 17,928 (41.8%) participants that did respond, 1,514 (8.4%) participants responded "Often True," 4,461 (24.9%) participants

responded “Sometimes True,” and 11,953 (66.7%) participants responded “Never True” illustrated in Figure 3.

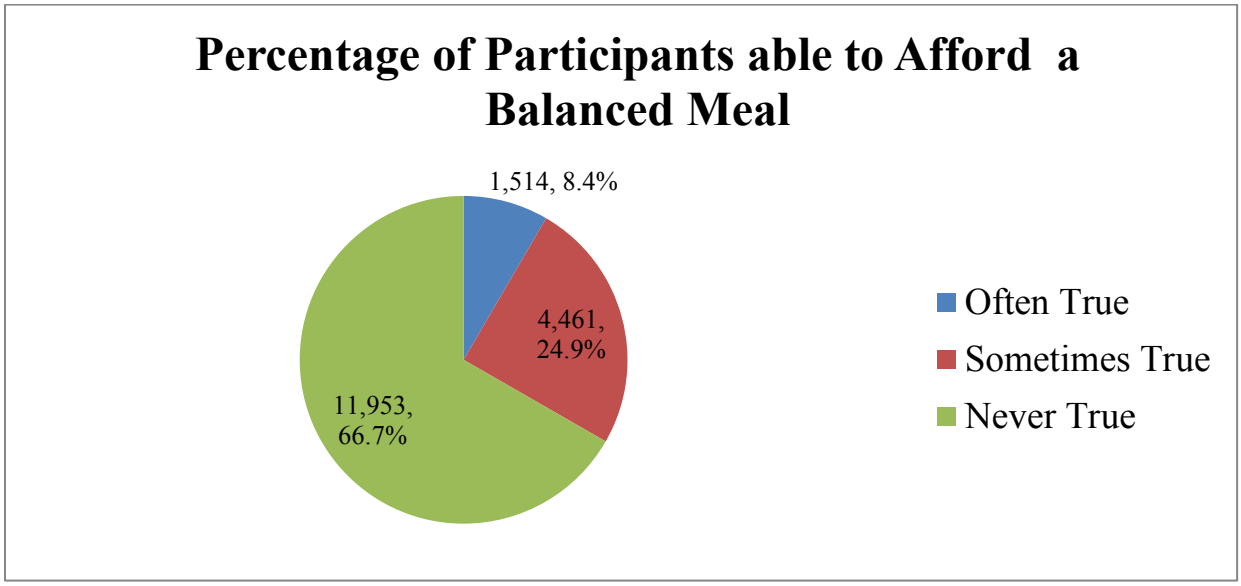

FIGURE 3. Distribution of participant’s ability to afford a balanced meal.

Hypotheses Testing

Hypothesis 1 predicted that participants that identified themselves as being part of the lower SES population are less likely to be able to afford and eat balanced meals than people who did not identify themselves as being part of the lower SES population. In order to determine the role SES plays on participant’s ability to afford and eat balanced meals a *t*-test was calculated between the dependent variable which consisted of participant’s ability to afford and eat balanced meals, and the independent variable which consisted of participant’s FPL. For the ability to afford and eat balanced meals, the *t*-test

of the difference between means between participants who are 0-99% of the FPL and participants who are 100-199% of the FPL produced statistically significant results (t (13,754) = -14.518, p = .000). With a significant p-value, we reject the null hypothesis. The mean of participant's ability to afford and eat balanced meals that are 0-99% of the FPL was lower (M = 2.41, SD = .708) than the mean of the ability to afford and eat balanced meals for participants that are 100-199% of the FPL (M = 2.58, SD = .708). Hypothesis 2 was supported; there were 6,127 participants who are 0-99% of the FPL and could not afford to eat balanced meals as opposed to 7,629 participants who are 100-199% of the FPL and could not afford to eat balanced meals.

Hypothesis 2 predicted that the number of people diagnosed with diabetes type-2 is higher among FSP participants than the number of people diagnosed with diabetes type-2 who are not participating in the FSP. In order to determine the role being diagnosed with diabetes plays on participant's participation in the FSP a Chi-square test was calculated between the dependent variable which consisted of participant's participation in the FSP and the independent variable which consisted of being diagnosed with diabetes. The results of the Chi-square test showed that the association was found to be statistically significant (X^2(2, N = 3028) = 6.593, p = .037). With a significant p-value, we reject the null hypothesis. The 2011-2012 CHIS data set was collected based on the response of different individuals from a single point of time. The limitation of observing participants at a single point of time contributes to the problem of establishing a true cause and effect relationship. Hypothesis 1 was supported; there were 219 participants that responded "Yes" to participating in the FSP and having type-2 diabetes

and 2,315 participants that responded "No" to participating in the FSP and having type-2 diabetes (See Figure 4).

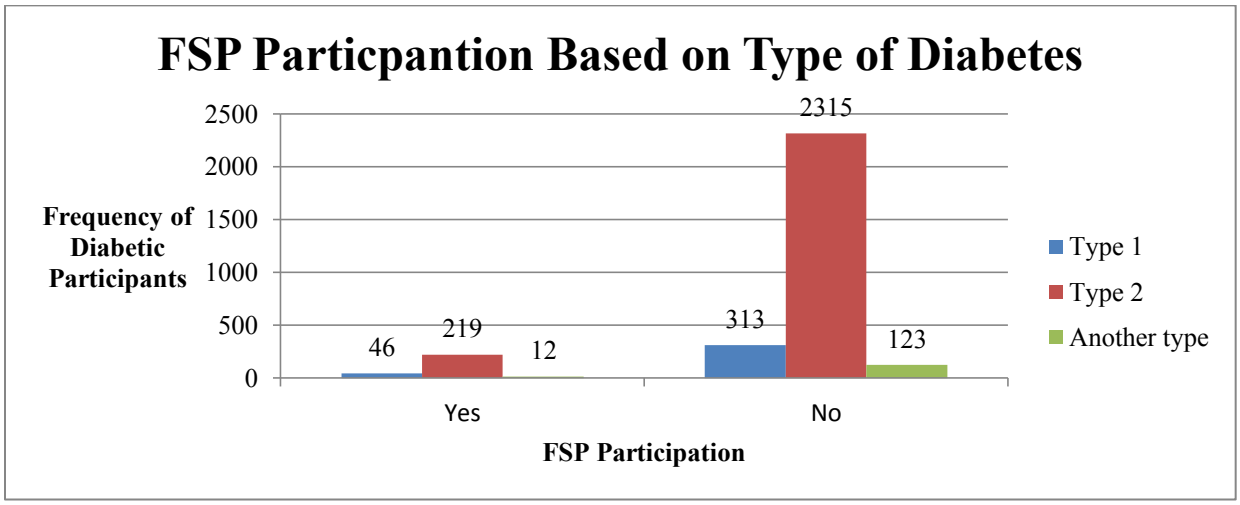

FIGURE 4. Type of diabetes distribution based on FSP participation.

Hypothesis 3 predicted that FSP participants are more likely to consume fast food and soda. In order to determine the role consumption of fast food and soda has on participant's participation in the FSP a *t*-test was calculated between the dependent variable which consisted of participation in the FSP, and the independent variable which consisted of the consumption of soda and fast foods. For the participation of the FSP, the *t*-test of the difference between means between participants who consumed fast food and did not consume fast food produced statistically significant results (t (23,054) = 23.227, p = .001). With a significant p-value, we reject the null hypothesis. The mean for participants that did consume fast food and participated in the FSP was higher (M = 1.34,

SD = 1.914) than participants that did not consume fast food and did participate in the FSP (*M* = 1.21, *SD* = 1.807). For the participants of the FSP, the *t*-test of the difference between means between participants who consumed soda and did not consume soda produced statistically significant results (*t* (23,054) = 14.99, *p* = .000). With a significant *p*-value, we reject the null hypothesis. The mean for participants that did consume soda and participated in the FSP was higher (*M* = 13.53, *SD* = 26.236) than the mean of participants that did not consume soda and did participate in the FSP (*M* = 7.27, *SD* = 17.970). Hypothesis 3 was supported; there were 2,288 participants that consumed soda and fast foods and participated in the FSP while 20,768 participants did not consume sodas and did participate in the FSP.

Hypothesis 4 predicted that among the FSP participants the mean of people who do not have the ability to afford and eat a balanced meal will be more likely to have been diagnosed with diabetes than FSP participants who do have the ability to afford and eat a balanced meal. In order to determine the role the ability to afford and eat a balanced meal has on participants who have been diagnosed with having diabetes a Chi-square test was calculated between the dependent variable which consisted of diagnosis of diabetes and the independent variable which consisted of the ability to afford and eat a balanced meal. The results of the Chi-squared test was used to determine if there was an association between being diagnosed with diabetes and being able to afford and to eat a balanced meal. The association was found to not be statistically significant (X^2(4, *N* = 2,439) = .668, *p* =.955). With a non-significant *p*-value, we fail to reject the null hypothesis. Hypothesis 4 was not supported.

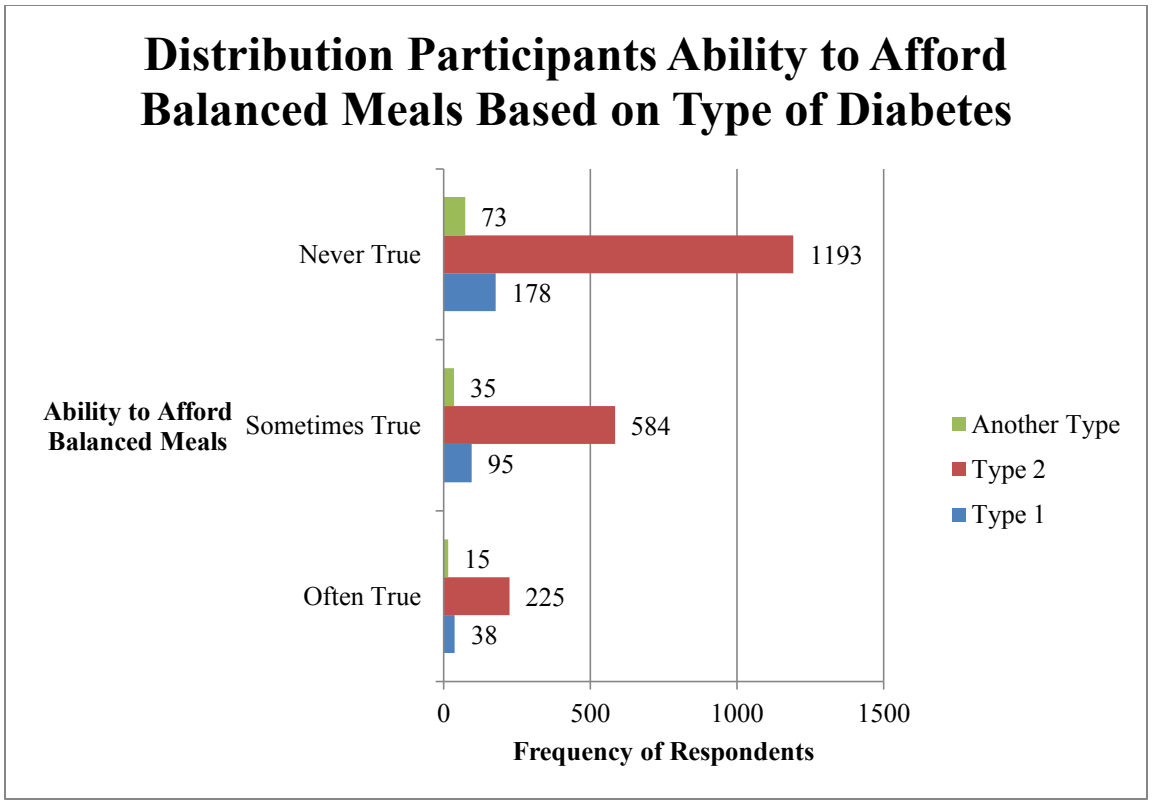

FIGURE 5. Distribution of participant's ability to afford balanced meals based on type of diabetes.

TABLE 2. Analysis

Hypothesis	Dependent Variable	Independent Variable	Statistical Test	*p*-value
1. Lower SES participants are less likely to be able to afford and eat balanced meals than participants that are not of the lower SES.	Able to afford and eat balanced meals (AM2)	Lower SES (POVLL)	*t*-test	$p = .000$
2. Diagnosis of diabetes type-2 is higher among FSP participants than non FSP participants.	Participation in the FSP (AL5)	Diagnosed with Diabetes (AB51)	Chi-square	$p = .037$
3. FSP participants are more likely to consume fast food and soda.	Participation in the FSP (AL5)	Consumption of soda and fast food (Soda – AC11, Fast Food AC31)	*t*-test	Fast Food $p = .001$ Soda $p = .000$
4. Among FSP participants those who do not have the ability to afford and eat balanced meals are more likely to have been diagnosed with diabetes.	Diagnosed with Diabetes (AB51)	Able to afford and to eat a balanced meal (AM2)	Chi-square	$p = .955$

The analysis of the hypotheses that are under investigation concluded in interesting results. Hypothesis 1, 2, and 3 all demonstrated statistical significance in their analyses. Hypothesis 4 was supposed to be the piece to the puzzle that would bring the findings in this study into full circle, and thus give an explanation to the phenomenon under investigation. However, hypothesis 4 did not demonstrate a statistically significant relationship.

CHAPTER 4

DISCUSSION

The inquiries of this study found that diabetes and health status are associated with SES and participation in FSP based on participants' responses to the 2011-2012 CHIS survey. Previous research has suggested that SES and food environment influence an individual's health and dietary habits. The findings of this investigation were demonstrated by testing four hypotheses and the results were as follows: (1) Participant's ability to afford and eat balanced meals was lower among respondents that reported being part of the 0-99% of the FPL population compared to respondents that reported being part of the 100-199% of the FPL population; (2) There was a higher concentration of participants that had diabetes type-2 and did not participate in the FSP compared to those that did participate in the FSP and were diagnosed with diabetes type-2; (3) The rate of consumption of sodas and fast food were higher among respondents that participated in the FSP when compared to those that did not participate in the FSP; and (4) The relationship between having the ability to afford and eat balanced meals and being diagnosed with diabetes among FSP participants was found to be non-statistically significant.

Hypothesis 1 predicted that participants that identified themselves as being part of the lower SES population are less likely to be able to afford and eat balanced meals than people who did not identify themselves as being part of the lower SES population. This

hypothesis does not focus on diabetes instead it examined the influence SES plays on participant's ability to afford and eat balanced meals, which aided in the understanding on how individual SES factors influence health. Participants had to be separated into two groups depending on FPL, group 1 consisting of participants that were anywhere from 0-99% of the FPL, and group 2 consisted of participants that reported being 100-199% of the FPL. Hypothesis 1 was supported in that lower SES has a statistically significant relationship to participant's ability to afford and eat balanced meals. The examination found that the mean of participant's ability to afford and eat balanced meals that are 0-99% of the FPL was lower than the mean of the ability to afford and eat balanced meals for participants that are 100-199% of the FPL. One explanation of the findings could be explained through the psychological theory known as Maslow's hierarchy of needs. Abraham Maslow explains that people have inherent physiological needs that need to be met before people can begin seeking higher levels of needs and wants. In this instance if people have less income at their disposal they are less likely to be able to afford and eat balanced meals. If a person has less income at their disposal it is possible that they would use the limited income to purchase more energy-dense foods like carbohydrates and fast food instead of more nutritious and balanced foods like protein, fruits and veggies. If FSP participants actively seek out energy-dense foods that lack nutrients that healthier, more balanced foods offer then naturally their overall health will suffer which can eventually develop into diabetes.

Hypothesis 2 predicted that the diagnosis of diabetes type-2 would be higher among FSP participants than non-FSP participants. This hypothesis aimed to examine whether or not the diagnosis of having diabetes impacted or was impacted by the

participation of the FSP, and as was stated above, the hypothesis yielded a statistically significant relationship. It is important to note that this hypothesis drew from a population of 3,028 respondents. One unexpected observation from this study was the higher concentration of participants that had diabetes type-2 who were not participating in the FSP. From a first look at Figure 4., one could conclude that the number of non-FSP participants that had diabetes type-2 was larger than the number of respondents that do participate in the FSP and have diabetes type-2, however the test showed that the two variables were statistically significant and that the resulting relationship between each other was not by random. Because the number of participants that responded "No" to participating in the FSP and had some type of diabetes was larger than the population of participants that responded "Yes" to participating in the FSP and had some type of diabetes, the respondent size may have influenced the results. Given the larger sample size for respondents that did not participate in the FSP there was a greater opportunity to observe more respondents that had diabetes type-2. If the sample population for both participants and non-participants of the FSP that have diabetes type-2, we might have seen a larger number of respondents that did participate in the FSP and have diabetes type-2. Of course it is rare to examine an instance where both populations under investigation have equal or similar sample sizes. It is also important to note the implications of these results; since there seems to be a statistically significant relationship between being diagnosed with some form of diabetes and participation in the FSP perhaps there are different factors that contribute to this issue. As stated earlier in this study various factors including environmental, availability of food or suppliers, and education of nutrition all play a role in shaping an individual's dietary habits and overall

health. In demonstrating a statistically significant relationship between being diagnosed with diabetes and participating in the FSP, we can assume that the influence one factor has on the other is not by random chance. In future research if we can establish that their influence on each other is not just by random chance then perhaps our government could reassess the efficacy of the FSP as well as the overall goal of the FSP. After investigating a relationship between the two the next step would be to examine the factors that shape and influence each other.

Hypothesis 3 predicted that FSP participants are more likely to consume fast food and soda. This hypothesis sought to examine the relationship between consumption of sodas and fast foods with the participation in the FSP. Our *t*-test results indicated that there was a statistically significant relationship between fast food consumption and participation in the FSP and soda consumption and participation in the FSP. The mean of participants that did consume fast food and soda and participated in the FSP was higher than participants that did not consume fast food and soda and did not participate in the FSP. A greater consumption of fast foods and sodas can be an indicator of other issues affecting the target population. A higher rate of consumption of fast foods can be due to a lack of suitable healthy alternatives. In lower SES communities we find a higher concentration of liquor stores, corner stores, and fast foods than supermarkets.

Laska et al. (2010) write:

> Greater access to neighborhood grocery stores was associated with better dietary intake and lower obesity rates among adults, and in contrast, greater access to convenience stores and restaurants, including fast food, has been associated with less favorable diet quality and increased obesity, although the findings are not consistent. (P.1757)

This lack of alternative healthy foods put people in these areas at greater risk for health problems. Laska et al.'s 2010 study found that after adjusting for gender, age and SES, adolescents' sugar sweetened beverage intake was associated with residential proximity to restaurants (including fast food), convenience stores, grocery stores and other retail facilities within the 800 and/or 1600m residential buffers. BMI Z-score and percentage body fat were positively associated with the presence of a convenience store within a 1600m buffer (Laska et al., 2010). In certain areas healthy foods such as fruits and vegetables can cost more than cheap filling snacks and junk foods. Jetter and Cassady's 2006 study found that when asking low-income consumers what were some of the constraints of eating healthier, their participants reported that price of healthier foods was the main barrier. In other areas the availability of food can be extremely abundant or extremely scarce. These areas are characterized as *food deserts or food oasis.* Walker et al. (2011) reported that the cost of food was higher in urban areas compared with suburban areas because of the higher operating costs in urban areas. Other studies reported in Walker et al. (2011) suggest that higher prices are a result of the smaller quantities of food items and the increased amount of processed foods that are available in smaller stores in urban neighborhoods. In any situation it seems that government

intervention to help the lower SES populations through the FSP does not resolve the issue of the unavailability of healthy food alternatives and the availability of non-healthy foods. However, government can use its power to regulate operating costs or provide some form of incentive to provide more food markets in suburban areas. With the greater availability of food markets, populations that do not have the option of healthier foods being available to them now do.

Hypothesis 4 predicted that among the FSP participants who do not have the ability to afford and eat a balanced meal will be more likely to have been diagnosed with diabetes than FSP participants who do have the ability to afford and eat a balanced meal. This hypothesis was used due to the findings of the other hypotheses. A case was being built up that suggested participation in the FSP could lead to a greater chance of developing diabetes. However, as we see with other complex constructs the results of this hypothesis suggest that there is no statistically significant relationship between the ability to afford and eat a balanced meal and being diagnosed with diabetes among FSP participants. Although the other three hypotheses showed a statistically significant relationship between their variables this one did not. Understanding the relationship between being diagnosed with diabetes and participation in the FSP is a complex matter with multiple factors that can contribute to or cause a result.

Conclusion

From the research we have learned that there are a multitude of factors that influence the complex relationship between participating in the FSP and the likelihood of developing diabetes. The factors that have discussed in this research coincide with the body of knowledge that was collected in the literature review which includes SES, food

environments, and eating habits. Given that people who participate in the FSP have less disposable income available to them; their access to a variety of fresh and healthy food is already limited. In these suburban areas where the target populations are from there are even less supermarkets and more liquor stores, which further limits their access to fresh and healthy foods. With these limitations in place, the struggle to maintain or prevent the development of diabetes is an issue that seems to be exacerbated by government intervention through the FSP. To resolve this issue, government intervention should not only focus on the target population's financial needs but the environments that influence their overall health as well.

Strengths and Limitations

This test has barely scratched the surface of understanding the phenomenon under investigation. Specifically, the strengths of this study are that the data analyzed were collected and used from the CHIS. The sample population that survey was based on would be considered a true random sample of individuals living in various counties in the state of California. Since the data was collected from a true random sample, the findings could be applied in real world applications in regards to the population of California. The applications of this study are generalizable to the population of California, and in future studies perhaps researchers could begin tugging at the strings the influence California's population. Once the researchers begin to understand the nature of the environment other findings could be generalized to other parts of the world.

This study like many other studies was not without its limitations. The data collected from testing hypothesis 2 was cross-sectional, and therefore no causal inferences about their relationships could be made. Although some of the associations

made between certain variables were significant, there is not enough evidence to assume cause and effect. This study was able to replicate previous research on discovering an association between living below the FPL and not having the ability to afford and consume fresh foods, however no causal association between any of the variables mentioned earlier could be confirmed.

Another limitation of this study is that the statistical analyses were limited to bivariate associations. Future research should look at more complex multivariate analysis. However, we seem to reach a wall in the research due to the cross-sectional nature of the data, multivariate analyses could not determine causal relationships.

Recommendations

The results of this study highlighted the importance of SES, food environment, food purchasing habits and perspectives and their influence on the participation in the FSP, being diagnosed with diabetes, and the ability to afford and eat balanced meals. These variables can be used in future research as the avenues of investigation that would eventually lead to a larger body of knowledge. To completely understand the complexities of this phenomenon would be an extremely difficult task to characterize and understand in a single study. To gain a broad detailed picture, researchers should assess various aspects of the phenomenon such as dietary habits and how people's income influences their purchasing choices. The greater understanding the researchers have about the target population, the closer researchers will come to understanding and resolve the issue. The results from this study demonstrate where specific areas of the public health sector could benefit from government intervention.

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