SOCIAL ENVIRONMENT AND SELF-MANAGEMENT BEHAVIORS AMONG AFRICAN AMERICAN DIAGNOSED WITH TYPE-2 DIABETES

An Undergraduate Research Scholars Thesis

by

MIRYAN GUADALUPE JARA

Submitted to the Undergraduate Research Scholars program at
Texas A&M University
in partial fulfillment of the requirements for the designation as an

UNDERGRADUATE RESEARCH SCHOLAR

Approved by Research Advisor: Dr. Idethia Shevon Harvey

May 2018

Major: School Health

TABLE OF CONTENTS

ABSTRACT

Social Environment and Self-Management Behaviors among African Americans Diagnosed with Type-2 Diabetes

Miryan Guadalupe Jara
Department of Education and Human Development
Texas A&M University

Research Advisor: Dr. Idethia Shevon Harvey
Department of Health and Kinesiology
Texas A&M University

Introduction: In the United States, 9.4% of Americans have been diagnosed with type-2 diabetes. African Americans residing in Texas have the highest prevalence rate for type-2 diabetes (16.6%). Despite the tremendous strides in type-2 diabetes management behaviors, African Americans do not achieve optimal outcomes and experience complications that result in diminished quality of life. The purpose of this pilot study is to explore the self-management practices of African Americans residing in rural and micropolitan Texas diagnosed with type-2 diabetes. Methods: The pilot study conducted semi-structured interviews and photo-documentation among African Americans diagnosed with type-2 diabetes. Questions elicited descriptions for self-management behaviors with a focus on social and physical environments. Digital audio files were transcribed verbatim, and data analyzed using thematic content analysis. After each interview, quantitative data were entered into SPSS v21. Photographs documented the barriers and facilitators to self-management behaviors. Results: The study consisted of a convenience sample of 10 participants. The average age of the participants was 58.70 *(S.D.=10.96)* years of age with an average BMI of 34.61 kg/m^2 *(7.69)*. On average, the participants where managing 3.30 *(S.D.=2.11)* other health conditions. The qualitative data

identified three primary themes: 1) food and nutrition, 2) sociocultural factors, and 3) neighborhood characteristics. The photo-documentation confirmed the toil of managing diabetes among the participants living in under-resourced communities. Conclusion: The findings of this study found that the social and physical environment have a significant impact on how the participants self-managed their type-2 diabetes. Recommendations to improve health outcomes for Africans Americans with type-2 diabetes would include developing infrastructure in rural areas, accessibility to quality food, educational classes for social relationships such as family members and friends, and additional educational classes for the participants on type-2 diabetes management techniques.

DEDICATION

This thesis is dedicated to my parents, Irma and Roberto Jara, who without their hard work and unconditional love and support my undergraduate journey would not have been made possible.

ACKNOWLEDGEMENTS

First and foremost, I would like to thank Dr. Idethia Shevon Harvey who has been my thesis faculty advisor for the past two years and accepted me to work in her lab for the past four years. Dr. Harvey has patiently spent countless hours helping and encouraging me to complete this thesis. I will forever be grateful I have been able to be a student researcher in Dr. Harvey's lab.

I would like to thank PhD candidate and mentor, Rahma Mkuu. For the past three years, Rahma Mkuu has ongoing helped mentor me and pushed me to apply for internships and seek professional development opportunities. Her enthusiasm and determination is very inspiring and I am grateful to have met her.

I would also like to thank the College of Education and Human Development for their professional sponsorship that allowed me to present and experience the Annual American Public Health Association meeting for 2016 and 2017. I would also like to thank the Transdiciplinary Center for the Health Equity Research (TCHER) for their continuing support is my time there as a student researcher. I would like also like to thank student lab researchers at TCHER for their tremendous efforts and help in gathering and inputting data.

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

What is Diabetes?

Diabetes is a chronic condition that occurred when the pancreas does not produce enough insulin, or the body is unable to efficiently use the insulin it does produce or a combination of both (National Institute Diabetes and Digestive and Kidney Diseases (NIDDK), 2016). Insulin is the hormone that regulates blood sugar, metabolizes fats, and provides energy for the body to function efficiently. Usually, the body breaks down sugars and carbohydrates from a consumed meal and processed the meal into glucose. Afterwards, the pancreas releases insulin into the bloodstream. Insulin is the signal for cells to take in the glucose to harvest their energy. There are two types of diabetes: type-1 diabetes (T1D) and type-2 diabetes mellitus (T2D).

Individuals diagnosed with T1D have an autoimmune condition that causes the insulin-producing cells to destroy their immune system. Therefore, individuals diagnosed with T1D may have a genetic disposition that prevents them from producing insulin. The most common form of diabetes is T2D. Individuals diagnosed with T2D are unable to produce enough insulin which makes the insulin ineffective in signaling the glucose into the cells. While treatment for individuals diagnosed with T1D required insulin injections, individuals diagnosed with T2D regulate their blood glucose levels through oral medications or insulin injections in addition to behavioral changes (i.e., exercise and eating healthy) (Diabetes Research Institute Foundation, 2016).

For individuals to manage their T2D efficiently, they must consistently monitor their glucose levels, take their prescribed medications, and take care of their overall health. The

challenge in the diagnosis of T2D is that individuals can be asymptomatic for several years before they are diagnosed with the disease. Uncontrolled T2D can have a domino effect on major organs systems in the body including the cardiovascular system, urinary system, and nervous system. Type-2 diabetes can cause an increased risk of heart attacks, stroke, vision problems, necrosis, and irreversible end-stage kidney disease. These complications can eventually be life-threatening (Mayo Clinic, 2016).

Prevalence of Type-2 Diabetes in the U.S.

According to World Health Organization, 422 million people were diagnosed with T2D and is the seventh leading cause of death in the United States (World Health Organization (WHO), 2016; American Diabetes Association (ADA), 2017). It is predicted that T2D will affect 522 million people by the year 2030. The prevalence rate of Americans is 9.4 percent (ADA, 2017). Each year, an alarmingly number of Americans are diagnosed with T2D (e.g., 1.4 million) (ADA, 2017). The following conditions associated with T2D are high blood pressure, high cholesterol, mobility limitations, limitations in instrumental activities of daily living, severe vision impairment or blindness, and coronary heart disease (Texas DSHS, 2013). The rates of cardiovascular disease and hypoglycemia exceeded those of the state of Texas (46.4% and 9.9%, respectively) (Texas DSHS, 2013). Even worse, over one out of four individuals (i.e., 29 million) can be diagnosed with prediabetes. Individuals who fall into this category do not know they have the condition and are not adequately managing the chronic disease (Centers for Disease Control and Prevention (CDC), 2014).

Prevalence of Type-2 Diabetes in Texas

Texas ranked 17th out of the 50 states with adults being diagnosed with T2D (11.4%) (State of Obesity, 2016). In 2013, there was an estimated 11% of adults diagnosed with diabetes

and 8.1% with prediabetes. The total number deaths in the state of Texas caused by diabetes were 5,262 (Texas Health and Human Services, 2015). According to the Texas Business Group on Health Type 2 Diabetes Report of 2016, approximately 3,156 T2D patients in the city of Bryan-College Station was diagnosed with T2D in 2015. The gender divide is almost split equally among recently diagnosed residents in the Bryan-College Station (i.e., 45.9% of males and 54.1% of females). Residents in Bryan-College Station diagnosed withT2D had the following complications due to T2D such as cardiovascular disease (56.1%), hypoglycemia (17.2%), nephropathy (34.8%), neuropathy (26.9%), and peripheral artery disease (15%).

Burden of Care: (Cost of Type-2 Diabetes)

Diabetes is more than just an emotional and physical burden; it is also a financial strain. Annually, the United States contributes an estimated total of $245 billion to diabetes-related T2D programs and treatments. Of that $245 billion, $176 billion is directly associated with the medical cost of diabetes and $69 billion is related the reduction of productivity related to diabetes (Carter-Edwards, et al., 2004). In the state of Texas, the total cost of diabetes is approximately $67 million. Roughly $27 million is in direct medical costs, and $40 million in indirect costs (i.e., inability to work, work absenteeism, presentism, household productivity loss and mortality) (Rotberg, et al., 2016). Interestingly, the United States spends the most on healthcare compared to other high-income nations; yet still has some of the worst health outcomes. On average, the U.S. spends $9,086 per person annually on health care, and the life expectancy is 78.8 years whereas Japan spends $3,713 per person annually and has the highest life expectancy of 83.4 (ADA, 2015).

Factors Associated with Type-2 Diabetes

Genetics, environmental, and health risk factors are the three main influencing characteristics associations with diabetes. The T2D prevalence rates among African Americans has quadrupled in the past 30 years. African Americans are 1.7 times more likely to develop T2D and develop greater co-morbidities from diabetes-related complications compared to their white counterparts (CDC, 2017). The relationship between hyperinsulinemia, hypertension, dyslipidemia, and coronary artery disease is known as metabolic syndrome. To be diagnosed with metabolic syndrome, an individual must have abdominal obesity, hypertriglyceridemia, hypertension, high fasting glucose and/or low levels of high-density lipoprotein. When an individual has 3 or more of these conditions, they are diagnosed with metabolic syndrome. Among African American men, the prevalence rate for developing metabolic syndrome is 16% compared to white men who prevalence rate is 25%. However, African American women have the highest prevalence rate (i.e., 26%) of developing metabolic syndrome compared to white women prevalence rate is 23% (Marshall, 2005). Consequently, African Americans with T2D have a higher rate of developing retinopathy, end-stage renal disease, lower extremity amputation, and mortality compared to non-Hispanic whites (Marshall, 2005). This could be in part because African Americans (41.4%) has the highest prevalence rate of obesity while Hispanics (39.2) have the second highest prevalence and non-Hispanic whites (27.9%) with the lowest prevalence rate of obesity. Obesity is a significant risk factor for developing T2D (Texas DSHS, 2013). In Texas, 9.6% of African Americans were diagnosed with prediabetes, and 12.9% of African Americans were diagnosed with diabetes compared to 8.5% of non-Hispanic whites being diagnosed with prediabetes and 9.9% being diagnosed with diabetes (Texas Health and Human Services, 2015).

Researchers found that the genetic risks associated with T2D were genes involved in glucose metabolism (Schisler, et al., 2009). The researchers found that the participants of African descent had deregulation in blood glucose levels. Schisler and colleagues suggested that because of the environmental, genetic lineage, African Americans were not suited the new environments (Schisler, et al., 2009). However, other genetic studies found that fat mass and obesity associated factor (FTO) and the transcription factor 7-Like 2 (TCF712) to assess the genetic risk for obesity and T2D in African Americans (Grant, 2013). Recent studies analyzed the effect of FTO as a risk factor for developing T2D. Another gene that played a role in obesity is the melanocortin-4-receptor (MC4R). The MC4R is associated to affect energy balance, monogenic obesity, body mass index, height, increased appetite, and higher circulating insulin levels (Grant, 2013). Unfortunately, there are inconsistencies within the African American populations due to the lack of genetic material collected. In individuals of European descent with the risk allele of TCF712, the risk of developing T2D is 21% compared to those without the risk allele (Grant, 2013). In a recent study, African Americans with the risk allele had a higher risk of developing T2D and had abnormal metabolic profiles (i.e., obesity and low levels of HDL cholesterol) (Grant, 2013).

In addition, socioeconomic status and neighborhood environments are additional environmental risk factors associated with T2D among African Americans. The Jackson Heart Study, a longitudinal study among African Americans, demonstrated that African Americans diagnosed with T2D tended to be female, older, less educated, physically inactive, lower socioeconomic status, a family history of T2D and compared to African Americans without T2D at baseline (Gebreab, et al., 2017). African Americans in the study tended to live in neighborhoods with lower social cohesion and violence, unfavorable food stores and physical activity resources (Gebreab, et al., 2017).

Risk Factors for Type-2 Diabetes

There are several risk factors associated with type 2 diabetes (Mayo Clinic, 2016). The risk factors associated with T2D are age, gender, race, family history, obesity, and diet behaviors (Mayo Clinic, 2016).

Age

Type 2 diabetes (T2D) is more prevalent among adults, especially individuals 45 years of age and older (CDC, 2016). Approximately, 11.8 million Americans aged 65 years and older are diagnosed with T2D (ADA, 2017). In Texas, the rate per 100 people in the age group of 65 to 74 years of age is 24.6 while individuals 75 years of age and older it is 25.4 (CDC, 2013). Although T2D was known as adult-onset diabetes (i.e., more common in adults), as of 2009 it was estimated that 3,700 children were diagnosed with T2D (Gabel, 2012). By 2030, more than fifty percent of adolescents will be at risk for diagnosed with type 2 diabetes (Fagot-Campagna, et al.,2000). The increased amounts of cases are associated with youth aged between 10 to 19 years of age in minority population compared to non-Hispanic whites (CDC, 2015). Childhood obesity has more than doubled in children and quadrupled in adolescents in the past 30 years, with more than one-third of children and adolescents are either overweight or obese (CDC, 2017).

Gender

Gender is another risk factor for T2D. As of 2014, the age-adjusted rate of diagnosed diabetes per 100 individuals in the United States for males it is 6.6 whereas for females it is 5.9 (CDC, 2015). In Texas, the rate of prevalence of self-reported diagnosed diabetes in adults is 11.8 among males and 10.0 among females (CDC, 2013). However, it is important to note that T2D affects men and women differently. Women are at higher risk of being diagnosed with heart

disease and have lower survival rates and poorer quality of life after a heart attack. Women are also at higher risk for blindness and depression (Women's Health,2016).

Race

Native Americans have the highest prevalence (15.9%) of being diagnosed with T2D, followed by African Americans (13.2%), Hispanics (12.8%), and Asian Americans (9%) and non-Hispanic whites (7.6%). Among Hispanics the rate of T2D varies among national and origin. The prevalence rate for Puerto Ricans is 14.8%, Mexican Americans (13.9%), Cubans (9.3%) and Central and South Americans (8.5%). Among Asian Americans the prevalence rates among subgroups are as follows: 13% for Asian Indians, 11.3% for Filipinos, and 4.4% for Chinese, and 8.8% for other Asian Americans (ADA, 2017).

Family History

Family history is another risk factor that contributes to the prevalence rate of T2D. Individuals with T2D who were diagnosed before the age of 50 have children whose risk of getting diabetes is 1 in 7, and if they were diagnosed after the age of 50, their children have a chance of 1 in 13. If both the parents have T2D, the child's risk is 1 in 2. Although this is mainly due to genetics, lifestyle has a huge influence. Poor eating habits, obesity, and physical inactivity runs in families contributing to their risk of developing T2D (ADA, 2017).

Obesity

The single predictor for T2D is being overweight or obese. Approximately 90% of individuals diagnosed with T2D are either overweight or obese (Obesity Society, 2015). The prevalence rate of developing T2D is 3 to 7 times higher in individuals who are obese compared to individuals at a healthy weight. Individuals with a body mass index higher than 35 kg/m^2 are 20 times more likely to develop T2D. Individuals who carry most of the excess weight around

their waist have a higher incidence of developing T2D than those who carry it on their thighs and hips (Rogers, et al., 2017). African Americans have the highest prevalence rate of obesity (38.1%) followed by Hispanics (31.9%) and non-Hispanic whites (27.6%) (CDC, 2016). In Texas, the current adult obesity rate is 32.4 percent, with 11.4 percent adult diabetes, having the 15th highest adult obesity rate in the United States (State of Obesity, 2017).

Dietary Behaviors

Dietary behaviors profoundly influence individuals' health outcomes and are directly related to the food selection process and food consumption. In a study, 98 patients, with a mean age of 51.98 years of age whose average duration of diabetes was 9.76 years, were surveyed about the most important factors when selecting food. The highest mean response was taste followed by cost. Majority of the participants agreed that barriers to healthy eating included the cost of healthy food, the temptation to eating unhealthy food and stress-related inappropriate eating (Marcy, et al., 2011). Unhealthy diets, those with high content in fats, free sugars, and salt along with physical inactivity lead to cardiovascular diseases, T2D, stroke, gastrointestinal cancer, and obesity.

Other dietary factors that influence the risk of T2Ds include the type of food an individual consumes. Whole grains can help decrease the risk of developing T2D. Whole grains consisted of bran and fiber, which makes it difficult for digestive enzymes to break down the carbohydrates into glucose. This means that those carbohydrates are slowly being broken down and gradually raising blood glucose levels and in turn, insulin lowers the glycemic index. Individuals who ate 2 to 3 servings of whole grains per day were 30 percent less likely to develop T2D. Merely substituting refined grains with whole grains may help lower the risk of T2D by 36 percent (Harvard T.H. Chan School of Public Health (HSPH), 2017). Another dietary

behavior that may lead to T2D is drinking sugary drinks. Drinking one or more sugar-sweetened beverages per day increases the risk of T2D by 83 percent (HSPH, 2017). Sugary drinks increase weight, contribute to chronic inflammation, increase levels of triglycerides, decrease HDL cholesterol levels, and increase insulin resistance (HSPH, 2017). Limiting red meat and avoiding processed meat can help reduce the risk of T2D. Eating just one daily 3-ounce serving of red increases the risk of T2D by 20 percent while consuming just smaller amounts of processed red meat each day increases the risk of T2D by 51 percent (HSPH, 2017). However, substituting that protein with nuts, low-fat dairy, poultry, or fish can decrease the risk of T2D by up to 35 percent. Moderate alcohol consumption increases the effectiveness of insulin within the cells and may lower the risk of being diagnosed with T2D (HSPH, 2017). Smokers, especially heavy smokers, are 50 percent more likely to develop T2D than nonsmokers (HSPH, 2017).

Prediabetes is an additional risk factor associated with T2D. In the United States, 89 million Americans are living with prediabetes (CDC, 2014). Prediabetes occurs when blood glucose levels are higher than normal (100 mg/dl to 125 mg/dl), but not high enough to be diagnosed with diabetes (126 mg/dl or higher) (ADA, 2017). The risk factors for prediabetes are similar to T2D, which include age, race and ethnicity, physical inactivity, being overweight or obese, having a family history of T2D, and history of gestational diabetes (CDC, 2016). The recommendation to help prevent or delay the start of T2D is to lose five to seven percent of your body weight and to be physically active for at least 150 minutes each week (CDC, 2016).

Theoretical Framework

One of Healthy People 2020 primary goals is to enhance the understanding between the relationship of how diverse population groups navigate their physical environment and the impact the environment has on health (Thompson, et al., 2016). One way to improve health

outcomes of individuals diagnosed with T2D is social support and self-management behaviors. This study aims to identify critical aspects of social support and self-management behaviors among African-Americans diagnosed with T2D. Dietary behaviors, physical activity, and weight management are all modifiable risk factors that increase the risk of an individual developing T2D. The secondary aim is to explore the neighborhood characteristics among African Americans and the impact the neighborhood has on dietary behaviors and physical activity.

Social Support

Two factors influence the health outcomes of individuals--social support and environment. It is estimated that 7.6 million older adults in America feel the need for more emotional support (White, et al., 2009). Higher levels of social support are associated with better glycemic control, increased knowledge, enhanced treatment adherence, and improved quality of life. Lack of social support has been associated with increased mortality and complications (Strom, et al., 2012). Lack of social support in older adults tends to lead to more extended hospital or nursing home stays (White, et al., 2009).

Furthermore, according to a literature review by Strom and Egede, social support is a significant factor of self-management of T2D regarding achieving glycemic control and improving overall health outcomes (Strom, et al., 2012). Along with that, there are several subgroups such as satisfaction, type, and amount of the social support received that impact it is effective in managing T2D. Interestingly, Latinos and African-Americans had a more significant considerable inclination for social support from friend, family, peer and support groups as compared with Whites, who relied more on media and health-care professionals for social support (Strom, et al., 2012). There does seem to be gender differences in the amount and satisfaction level of social support received, with men reported higher rates of positive social

support sources compared to women. This may be explained in that women are often carrying the caregiver role in their households with is an excellent source of stress and barrier to performing self-managing T2D behaviors and reporting a lower quality of life (Tang, et al., 2008). A study by Carter-Edwards et al. (2004), further analyzed this issue of social support among African American women with T2D and self-management behaviors. They concluded the challenges that cause African American women difficulty in managing their T2D to be lack of understanding from family members, caregiving roles, and they are less likely to openly express their need for help (Carter-Edwards, 2004). Further research is needed to determine and develop plans to implement solutions to help both men and women develop effective coping mechanisms and have higher levels of satisfaction from their social support networks.

Physical Environment

Several factors in an environment affect individuals' health outcomes. These factors include infrastructures, transportation systems, restaurants, access to medical care and availability of parks (CDC, 2015). The environment is a huge aspect in achieving a better quality of life. Neighborhood characteristics indicate that there is an association between high levels of physical active (PA) and less driving with higher levels of cardiorespiratory fitness (CRF) and a lower BMI. Overall, the effects were modified by age (CDC, 2015). Neighborhood factors are socio-environmental factors that also impact health outcomes (Gebreab, et al., 2017). Poor neighborhood qualities, such as violence, lack of quality resources, lack of social support and reduced access to healthy foods have been shown to be barriers to performing self-care behaviors and attaining better health outcomes. Researchers from the Jackson Heart Study investigated the connection between neighborhood-, social-, and physical environments with the prevalence and incidence rates of T2D among African Americans (Gebreab, et al., 2017). The study found that

neighborhoods with high social cohesion had 22% lower incidence of T2D compared to neighborhoods with low social cohesion (Gebreab, et al., 2017). In addition, neighborhoods with a higher density of unfavorable food stores (i.e., convenience stores, bakeries, candy shops, ice cream stores, liquor stores, alcoholic drinking places, and fast food stores) had a 34% higher incidence of T2D (Gebreab, et al., 2017). In contrast, research conducted the California Healthy Cities and Communities found that participants engaged in school gardening programs with nutrition and physical activity education helped increase the number of physical activity sessions they had by 6% and increased their consumption of fruit and vegetables by 10% (Hoehner, et al., 2011). Social support and neighborhood characteristics can have an impactful influence on individuals' health outcomes. This study aims to research how both, social support and neighborhood characteristics are essential in self-management behaviors among African Americans.

CHAPTER II

METHODS

This honor thesis explores how African Americans diagnosed with type-2 diabetes managed their chronic conditions. The study design, recruitment and eligibility criteria, study procedures, measures, and data analyses are discussed in Chapter 2.

Study Design

Multiple methods design (i.e., quantitative methodology, qualitative methodology, and photo documentation) provided the opportunity to explore complex phenomena (e.g., managing type-2 diabetes among rural African Americans). Multiple methods research allows the phenomena to be explored and analyzed through more than one methodology (Creswell and Plane, 2007; Silverman, 2015). This approach was appropriate for this study given the exploratory nature of the research questions, the complexity of the type 2 diabetes self-management behaviors, and the geographical context of rurality among African Americans. Interviews were utilized to collect qualitative and quantitative data (Green & Thorogood, 2004). The in-depth interviewing involved a thorough conversation with the respondents to explore their perspectives on the phenomenon of interest (Boyce & Neale, 2006). In-depth interviews were used to discover detailed information about the participants' feelings about the diagnosis of type-2 diabetes and their self-management behaviors. For this study, interviews were used to provide context with other data such as quantitative data and photograph (Cuádraz & Uttal, 1999). Photo-documentation provided the visual verification that is difficult to describe in words.

The study occurred in two stages. The research project consisted of interviews to explore how African Americans manage their type-2 diabetes. Then, the researcher took photographs based on the in-person interview.

Recruitment and Eligibility Criteria

Recruiting participants for the study involved presenting the project to at community events and senior centers. The study was advertised in the local newspaper. Participants were eligible if they were 18 years of age or older, diagnosed with type-2 diabetes and African American.

Study Procedure

Ethical approval was obtained from the Texas A&M University Institution Review Board. The participants read and signed the informed consent before the interview proceeded. The interviews occurred face-to-face in the participants' home to aid in the confidentiality of the study and in their comfort of discussing their chronic condition. The in-person interviews allowed the interviewer to observe the physical residents and immediate physical environments. The interviews ranged from sixty to ninety minutes. All interviews were conducted by a trained interviewer using a semi-structured questionnaire. The semi-structured questionnaire inquiring about participants' experiences of diabetes, difficulties in health maintenance, length of time in neighborhood and perception of the neighborhood, and utilization of neighborhood for physical activity. The interviews were audio-recorded with the participant's consent. If the participant did not consent to the audio-recorder, the interviewer took detailed notes of the conversation.

Instrumentation and Data Collection

Measures

Sociodemographic Characteristics

Age, race, gender, and marital status was assessed through self-reported data. Annual household income and educational attainment measure socioeconomic status (Berkman & MacIntrye, 1997).

Summary of Diabetes Self-Care Activities

The Summary of Diabetes Self-Care Activities (SDSCA) (Toobert & Glasglow, 1994; Toobert, Hampson, & Glasglow, 2000) is a validated 12-item self-report questionnaire that measured diabetes self-care behaviors compliance over the past seven days. Twelve items assess the frequencies of specific self-management activities during the previous week; an additional item assesses smoking. Respondents mark the numbers of days (0–7) on which the indicated behaviors were performed. The item scores can be averaged to the five subscales general diet (2 items; e.g. ‘How many of the last seven days have you followed a healthful eating plan?’), specific diet (2 items; e.g. ‘On how many of the last seven days did you eat five or more servings of fruits and vegetables?’), exercise (2 items; e.g. ‘On how many of the last seven days did you participate in at least 30 minutes of physical activity?’), blood-glucose testing (2 items; e.g. ‘On how many of the last seven days did you test your blood sugar?’) and foot care (2 items; e.g. ‘On how many of the last seven days did you check your feet?’). All scale scores range from 0 to 7 with higher scores suggesting better self-management.

Lubben Social Network Scale (LSNS)

The Lubben Social Network Scale (LSNS) is a brief instrument designed to gauge social isolation in older adults by measuring perceived social support received by family and friends

(Lubben, Blozik, Gillmann, Iliffe, von Rentein Kruse, Beck & Stuck, 2006). It consists of 18 items (expended version) used to measure size, closeness and frequency of contacts of the participant's social network (i.e., family, friends, and neighbors. The LSNS has been used in both practice and research settings and has been used primarily with older adults from a range of settings including the community, hospitals, adult day care centers, assisted living facilities and doctors' offices (Lubben et al., 2006).

Diabetes-Specific Support Desired

The Diabetes-Specific Support Desired is a 5-item scale that assesses the extent to which individuals desire assistance from their social networks (i.e., family members and friends) in the form of tangible and emotional support related to the management of their type-2 diabetes (Connell, Fisher & Houston, 1992).

Diabetes-Specific Support Received

The Diabetes-Specific Support Received is a 5-item scale that assesses the extent to which individuals receive diabetes-specific support from their social network (i.e., family members and friends; Connell, Fisher & Houston, 1992).

Data Analysis

Quantitative Data Analysis

Data were entered into Statistical Package for the Social Sciences (SPSS version 24). Body mass index (BMI, kg/m^2) was calculated using the measures of height (meters) and weight (kilograms). Descriptive and statistical analyses were performed using SPSS. For descriptive analysis of quantitative variables, the mean and standard deviation (SD) was calculated. Bivariate correlates were estimated to test for relationships between demographic characteristics, social networks, and social support using Pearson product-moment correlations.

Qualitative Data Analysis

The goal of the interviews was to identify emerging themes to analyze and describe the experiences of African Americans diagnosed with type-2 diabetes. More specifically the study explored the perceptions of the participants' health; their perceptions of their environment; whether the perception of the environment affects their health behavior utilization; and whether objective environmental measures were reflected through their self-management behaviors.

Lincoln and Guba (1985) suggested that "the process of constant comparison stimulates thought that leads to both descriptive and explanatory categories" (pp 334-341). Categories are compared and categorized, and the relationships between categories are developed and refined over the course of the analytical process. Before coding, transcripts were reviewed to capture the essence of the interview responses. The goal of the coding process is to capture patterns of similarity among the respondent population, as well as patterns of difference among the respondents. The behavior domains were derived from the research questions, the initial and secondary coding process of interview responses, and comprised the categorization of the data during thematic development. The coding process is cyclical based on emergent themes. The process will consist of:

1. The evaluation of each interview response to capture the essence of the concepts;
2. Main themes development process;
3. Responses were cyclically categorized according to major domains;
4. Recoding produced no new codes or concepts, initiation of Phase 2 of the theme development (Lincoln & Guba, 1985).

Discussion between the undergraduate student and the graduate student on the research project was vital to the analysis process. After identifying codes during phase one, the undergraduate student and graduate student began to generate major themes.

Data Interpretation

Following the development of the themes, behavioral domains were linked to the data and the interview objectives using patterns among the participants. More specifically, themes were developed from major categories. Lincoln and Guba (1985) stresses that consistency reflects what was seen in the data. Reliability of data gathered was evaluated regarding the undergraduate student's position, sampling method, and triangulation. Furthermore, triangulation is particularly relevant to naturalistic inquiry design, because it provides various and divergent constructions of reality that exist within a context of study (Frey, Boton, & Kreps, 2000). Triangulation mixed-methods designs were used to converge multiple types of data; to transform data; to validate quantitative data; and to explore photographs (Creswell & Plano-Clark, 2007).

Pictures Documentation

To obtain a well-rounded understanding of the individuals' behavior, the study analyzed the environmental variables through the use of pictures. Pictures of the participants' surroundings, including grocery stores, parks, fast food restaurants, recreational facilities, farmers markets, convenience stores, health services/centers, neighborhood conditions, and transportation services. The overall condition of the neighborhood was photographed and rated on a scale of 1 through 5 and using the following points. The neighborhood condition category was rated for house/apartment complex overall appearance, sidewalks or streets within or surrounding neighborhood, intersections (e.g., determining if there are crosswalks available for

pedestrians), billboards or advertisements (e.g., fast food, health, and physical), pedestrian-friendly street signs, bike lanes, and crosswalks. The surrounding area and physical appearance of the health facilities, convenience stores, and fast food restaurants were rated. Grocery stores were analyzed by photographing their most common fruits and vegetables and pricing of their canned goods/produce items. Farmers markets was analyzed through the quality of the fruit, meats, and vegetables sold as well as their overall appearance. Pharmacies/drug stores were rated by the overall appearance, physical surroundings, and diabetes section. Recreational facilities were rated by their surrounding area, the condition of the facility, condition of the weights and workout equipment and condition of the locker rooms or storage space. Transportation services were rated by their light sources and benches/seats. Parks were rated by the condition of their walking trail/dog trails/ biking trails, upkeep of the park, amenities offered and light polls.

CHAPTER III

RESULTS

Data collection for the current study occurred over the course of eight months from October 2016 to May 2017. Ten participants who were diagnosed with type-2 diabetes were interviewed in the current study. The participants discussed the role of social support on self-management behaviors for type-2 diabetes. They lived in Bryan, TX or College Station, TX.

Quantitative Results

Participants

The ten participants who participate in the study reside in Bryan, TX (80%) and College Station, TX (20%). Eighty percent of the participants were female. The average participants age was 58.70 years (*SD* = 10.96). The participants' average years of type 2 diabetes diagnosis were 10.90 years (*SD* = 6.67). The average body mass index of the participants was 34.61 (*SD* = 7.69) indicating obesity amongst the participants. The majority of participants were married (40%), had at least a high school diploma (30%), and annual income between $15,000 - $19,999 (30%). The average number of health conditions the participants identified was 3.3 (*SD* = 2.11). The health conditions include arthritis, stomach problems, liver disease, kidney disease, bone weakness, high blood pressure, stroke, asthma, cancer, depression, memory problems, vision problems and hearing loss (see Appendix, Table 1).

Cross tabulations were used to measure the social support between family members and the participants. Cross tabulation of familial support showed that spouses and daughters (N = 4, 40%) were more likely to provide support to help the participants with type 2 diabetes management than sons (n =1, 10%) (see Appendix, Table 2).

Summary of Diabetes Self-Care Activities

The self-care activities of diabetes management asked participants about their behaviors including dietary behaviors, physical activity patterns, blood sugar testing, and foot care. The participants followed 3.50 days (*SD* = 3.31) of a healthy eating plan. In the past month, the participant followed a healthy eating plan 3.50 day per week (*SD* = 3.31). In the past seven days, participants reported eating five or more servings of fruits and vegetables 5.10 days (*SD* = 2.89) per week. In the past seven days, participants reported 3 days (*SD* = 2.98) days of eating high-fat foods such as red meat and full-fat dairy products per week. In the past seven days, participants reported evenly spacing their carbohydrates 3.10 days (*SD* = 2.92) per week. Participants exercise 2.70 days (*SD* = 2.50) per week. Participants tested their blood sugar 3.40 days (*SD* = 3.24) per week and followed the health provider recommendation 2.40 days (SD = 3.24) per week. The participants checked their feet 4.0 days (*SD* = 3.57) per week and inspected the inside of their shoes 3.11 days (*SD* = 3.69) per week (see Appendix, Table 3).

In the past seven days, 30% of participants reported smoking a cigarette. Ten percent of the participants smoked one cigarette in an averaged day; 10% of the participants smoked three cigarettes a day, and 10% of the participants smoked 30 cigarettes a day. In their last doctor's visit, 70% of participants were asked their smoking status. If the participants were identified as a smoker, only 10% received counsel regarding smoking cessation (see Appendix, Table 4).

Social Support

The participants were asked a series of questions related to their relationships with relatives, neighbors, and friends.

Lubben Social Network Scale: Relatives

The majority (90%) of the participants reported communicating with nine or more relatives at least once a month (90%), and 90% of the participants talked to their relatives daily. Half of the participants reported that their closest relative helps them manage their type 2 diabetes (50%) and the other half reported that they did not (50%). The participants reported that they felt at ease to talk (30%) and could call for help (30%) with five to eight relatives. The participants felt that they could always talk to their relatives when making an important decision (30%), and their relatives are always available to talk (30%) (see Appendix, Table 5).

Lubben Social Network Scale: Neighbors

The majority (30%) of the participants reported communicating with only two neighbors at least once a month, and 40% of the participants talked to their neighbors a few times a week. Ninety percent of the participants do not rely on their neighbors to help manage their type 2 diabetes. The participants reported that they do not feel at ease to talk (40%) and could not call on their neighbors for help (30%). The participants felt that they could never talk to their neighbors when making an important decision (50%), and their neighbors are not available to talk (30%) (see Appendix, Table 6).

Lubben Social Network Scale: Friends

The majority (40%) of the participants reported communicating with only two friends at least once a month, and 50% of the participants talked to their friends a few times a week. Forty percent of the participants friends helped them managed their type 2 diabetes. The participants reported that they felt at ease to talk (30%) and could call for help (30%) with three to four friends. The participants felt that they could talk to their friends sometimes when making an

important decision (40%), and their friends are sometimes available to talk (40%) (see Appendix, Table 7).

Tangible Social Support

Sixty percent of the participants relied on someone to help them with daily tasks, however, on 40% reported that someone always relied on them to complete daily tasks such as shopping, filling out forms, doing repairs, or providing childcare. Thirty percent of the participants lived alone, 40% lived with other relatives or friends, and 30% lived with a spouse (see Appendix, Table 8).

Diabetes-Specific Support Desired

The next section of questions deals with diabetes-specific support desired from participants from both their family and friends, in following a meal plan, taking medications, taking care of feet, being physically active, testing blood sugar levels, and handling emotions regarding type 2 diabetes. Participants (50%) wanted help from family members in following a meal plan, taking care of their feet (50%), being physically active (50%), and talking about their feeling regarding type 2 diabetes (60%). Participants did not want help in taking their medications (40%) and testing for blood sugar (40%) (see Appendix, Table 9). Participants wanted help from friends in exercising (60%) and talking about their feeling regarding type 2 diabetes (50%). Participants did not want help in following a meal plan (50%), taking their medications (50%), taking care of their feet (60%) and testing for blood sugar (60%) (see Appendix, Table 9).

Diabetes-Specific Support Received

Participants believed that they received help from their family members in following a meal plan (60%), taking their medications (50%), getting exercise (40%), and discussing

emotions about type 2 diabetes (50%). Participants did not receive help from their family members in taking care of their feet (40%) and testing blood sugar levels (40%) (see Appendix, Table 10).

Participants did receive help from their friends in talking about their type 2 diabetes (60%). Participants did not receive help from their friends in following a meal plan (50%), taking medications (70%), taking care of their feet (60%), getting exercise (60%), and testing blood sugar levels (80%) (see Appendix, Table 10).

Diabetes-Specific Support Acceptance

Participants were surveyed about how their family and friends accepted their type 2 diabetes. When asked about their family, 100% of participants strongly agreed that their family accepted them and their diabetes. However, when asked about their family, 100% of participants strongly disagreed that their family made them feel uncomfortable about them because of their type 2 diabetes. In addition, 100% of the participants felt that their family encouraged or reassured them about their diabetes. Only 30% of the participants believed that their family members discouraged them about their type 2 diabetes and 30% believed that their family members nagged them about their type 2 diabetes (see Appendix, Table 11). Ninety percent of the participants believed that their friends accepted them and their diabetes. Ninety percent of the participants do not believe that their friends made them feel uncomfortable about their type 2 diabetes. In addition, the majority (90%) of the participants believed that their friends encouraged them about their type 2 diabetes and did not discourage (90%) them about their type 2 diabetes. They also felt that their friends listened to them when they want to talk about their diabetes (80%) (see Appendix, Table 11).

Social Support – Direct Source of Help

Participants stated that they received help from their spouses (30%), children (50%), friends (10%), a medical doctor (30%), and nurse (20%). None of the participants received help from other family members, paid helper, case manager, or other help professionals (see Appendix, Table 12).

Social Support - Type of Help

The type of help they received differed from diabetes management specific tasks to daily living tasks. The participants received assistance in obtaining medications (60%), setting out medications, (20%), assist in housework (40%), and received transportation (50%) (see Appendix, Table 13).

Qualitative Findings

The qualitative portion of this study demonstrates the reasoning of these individuals' lives and why they do or do not participate in diabetes management activities, which are integral to self-managing T2D. It will help in understanding barriers preventing the participants to live the healthiest life.

Three salient themes emerged from the self-management behaviors among ten African American adults diagnosed with type 2 diabetes. Afterward, the student researchers took photographs from participants' environments. The themes were grounded in the participants' quotes in each thematic description. The three themes identified from the participants were 1) food and nutrition, 2) sociocultural, and 3) neighborhood characteristics.

Themes

Food and Nutrition

The study found that several participants considered nutritional habits such as food and nutrition as a critical self-management behavior. The themes included knowledge, attitudes, behaviors or struggles regarding food and nutrition participants had when managing their T2D. The participants in this study felt that nutrition was the hardest aspect of managing their T2D. The main struggle in managing T2D was not the preparation of nutritious meals, but the difficulty in accessing quality foods. The participants reported their struggles with sugar cravings and consumption of unhealthy foods. For example, although the female participant acknowledged that she needs to eat a healthy diet, she struggled with her soda dependence (her favorite food).

> I try to get [Pepsi] the day before so I can make sure I have some for that day. I might drink seven, eight Pepsis a day . . . Yes, because all I do is think about the Pepsi. I don't know why. It's a habit . . . This is what I buy every morning, three cans of Pepsi and another pack of cigarettes. And then, when I get up in the morning, if I can catch somebody, I get me three more. And that's how it is. It's a routine. I pay more in cigarettes and Pepsi than I do in rent, and I know it's wrong . . . Than in groceries, because if I got me three sodas and a pack of cigarettes, I won't even cook. (56-year-old African American female with a high school degree and four living children living in Town B diagnosed with T2D since 2002 (for 16 years); her toes were amputated in 1994. Her comorbidities are kidney disease, high blood pressure, high cholesterol and a stroke.)

Another nutritional restriction the participants experienced was the high cost of healthy foods, along with the accessibility and availability of foods, as expressed by two of the participants.

> To eat healthy is very expensive. To eat fresh fruit, and fresh vegetable every day, that means you've got to go to the store every three days. That's unaffordable for some folk, and I'm one of them, so I make due. (56-year-old African American

man with some college experience living in Town A diagnosed with T2D for 11 years and living with bursitis.)

Most participants received nutritional information regarding healthy eating as from their medical doctors, registered dietitians, or from family members.

> I mean, it's not that I need any help. I just need – I don't know what you would call it. I guess more direction or something. Like with the food, it's not so much – yeah, I just need more help. I know if I go to a nutritionist, I know they're going to – they'll tell you the spiel, but I don't know. Mine is, I think it's more just what I can't – you know, trying to find a variety or a balance of what I can eat. (56-year-old African American female living in Town B diagnosed with T2D for a little over 1 year. Her comorbidities are high blood pressure, osteoarthritis, ovarian cancer, and physical injuries resulting from a recent fall).

Most of the participants have two or more chronic conditions in addition to T2D, and therefore the additional medical concerns impacted the self-management of T2D behaviors. Being overweight and obese were added risk factors to medical-induced severe health conditions. Several of the participants described their complications with preserving a healthy weight.

> After my heart surgery, I did end up in 2010 having to have bypass surgeries. It's when my cardiologist advised me to really get serious about the situation. That's when I really became serious in more ways than one. I was weighing around 330, I ate what I wanted and did whatever. I was just of that mentality . . . I'm not going to lie about it. Once I came out of heart surgery, I realized, if you want to live you go to do something. I started watching what I was eating, lost a lot of that weight. I've gained some weight since I've moved over here and after I quit working. I just got serious with it. I found out most of mine has come by diet. (74-year-old African American man with two bachelor's degrees living in Town B, diagnosed with T2D for 18 years. His comorbidities are stomach ulcers, high blood pressure, and gout.)

Another female participant described her struggles in maintaining a healthy weight. She acknowledges the struggles and how in impact her T2D self-management behaviors.

> Yeah, there's been some positive changes, but there's struggle. There's struggles, and so that's my part with it, right now, is that I'm struggling. And that's the thing with the weight. The weight keeps going up and down because I'm struggling so hard. (56-year-old African American female living in Town B diagnosed with T2D for a little over 1 year. Her comorbidities are high blood pressure, osteoarthritis, ovarian cancer, and injuries resulting from a recent fall.)

Along with maintaining a healthy weight, the participants made other lifestyle changes to manage their T2D successfully. One of the many ways in which participants incorporated healthier eating was to make 'small tweaks' in their everyday lives such as drinking diet soda instead of regular soda or limiting their sweets intake from daily to once a month. The participants increased their vegetable intake, created a nutritional diary, and made substantial changes to their diets. Every participant made some changes to incorporate healthier nutrition behavior.

> Only thing is, I try not to fry too much food, not fry a lot of foot, and do a lot of grilling and baking. (45-year-old African American female with a master's degree living in Town A diagnosed with T2D for 17 years. Her comorbidity is high blood pressure.)

Another male participant described how he changed his eating habits.

> Absolutely, I do more greens. It's more greens. It's more vegetables. At first, I didn't care how much chicken I ate. I could have eaten it three times a week. Now, I know better. I don't eat ice cream every week, maybe once a month, that kind of thing. And I love pasta, so I monitor my pasta intake. But that's internal. That's what I do for me because I know that it's going to help me in the long run . . . The only rice that I changed was from regular, enriched white rice to jasmine rice. I get that from – and I don't know the name of it. It's [name of grocery store. . . I go there, and I get some brown eggs from them, too . . . like that raggedy store. I really do because I'm able to find what I need when I want to change up things. (56-year-old African American man with some college experience living in Town A diagnosed with T2D for 11 years. Her comorbidity is bursitis.)

Although the female participant regularly eats out, she is aware of how her food is prepared.

> I really just don't like eating out. I like to fix my own food. That way, I know and control what I'm eating… Well, it's just something that I just know that's good from me 'cause I can control what's going into my food. Like, the meat I bought, I can't control what's already in there, but I can control what I add to it." (75-

> year-old African American female with a master's degree living in Town B diagnosed with T2D for 15 years. Her comorbidities are high blood pressure, arthritis, and cataracts.)

Lastly, the female participant described her nutritional transformation health behavior.

> I have never tried to go cold turkey [be]cause I think, if I did cold turkey, and I slip up, I'm going to overindulge, and so I just do little by little. You know, taper down and to go from there. And if I want a soda, I might get a diet soda or something like that. Instead of getting a full sweat tea. I get half and half tea [half sweetened and half unsweetened tea]. (45-year-old African American female with a master's degree living in Town A diagnosed with T2D for 17 years. Her comorbidity is high blood pressure.)

Sociocultural Factors

The sociocultural factors included any social and cultural factors related to lifestyle behaviors. The theme focused on how the participants' education, social relationships, religion, and culture influences their beliefs regarding and understanding of their chronic condition and their disease management. One of the barriers participants experienced was the lack of support from the health care providers and the restrictive healthcare system. The participants were affected by several levels from getting services that focus on the prevention and reduction of T2D risk factors to getting adequate care for managing T2D. For example, one of the female participants discussed her interaction with her primary care physician.

> Interviewer: So, if you smoke, and at your last doctor visit, did anyone counsel you to stop smoking or offer you a stop-smoking program? Respondent: No, because years ago, when he kept telling me, I need to quit, I need to quit, and he saw I wasn't quitting, then he stopped saying it. (56-year-old African American female with a high school degree and four living children living in Town B diagnosed with T2D since 2002 (for 16 years); her toes were amputated in 1994. Her comorbidities are kidney disease, high blood pressure, high cholesterol and a stroke)

The female participant continues to describe her substandard medical treatment with other healthcare professionals.

> And the other doctor that I was supposed to be going to for it [diabetes] says, 'I'm going to take your blood,' and he never does. He just refills my prescription, three months' supply, and I don't have to see him for another three months." (56-year-old African American female with a high school degree and four living children living in Town B diagnosed with T2D since 2002 (for 16 years); her toes were amputated in 1994. Her comorbidities are kidney disease, high blood pressure, high cholesterol and a stroke)

Without the supportive healthcare relationship, the same participants discussed how she stopped receiving her supplies to help manage her T2D.

> And the reason I don't prick my finger is because something had happened with Medicaid one year. I don't know if it was when Obama got in there. I don't know what had happened. And the people started sending me surveys and stuff, like you're doing, and the doctor had told me – he's a quack – and he told me to go to – was it Liberty or somewhere? To get the stuff. So, we did that. And so, we did that, but he said the only way that I could get it was that I had to prick myself twice a day. So, I said, "Okay." And then I was doing it, and that hurt. So, when the people sent the survey thing, I didn't want to lie and say that I was doing it twice a day, because I wasn't. And then, they wanted me to write down what my. . . [glucose levels] were. Yeah, and I didn't want to put too high, too low. And then, something happened to me . . . So, I just left it all alone . . . And they [health insurance] stopped send it. Mm-hmm. Sometimes I worry. I don't even know what my sugar is, because sometimes I have a headache. I don't know if my sugar is high or low or what. But if I shake or something, then I'll drink a soda." (56-year-old African American female with a high school degree and four living children living in Town B diagnosed with T2D since 2002 (for 16 years); her toes were amputated in 1994. Her comorbidities are kidney disease, high blood pressure, high cholesterol and a stroke)

Although the role of the church had been known to have a positive relationship on the management of T2D, the participants in this study described a non-supportive relationship with the local church family. For example, one of the participants did not belong to a religious organization but attend a bible study within the apartment complex. Due to her being a double amputee, she was homebound.

> And I don't go [to church]. I go to the bible study across the street, and they're right across the street. I do need to find a church, but I like going there. I don't have to depend on nobody to take me. I can roll across the street and come right back. (56-year-old African American female with a high school degree and four living children living in Town B diagnosed with T2D since 2002 (for 16 years);

> her toes were amputated in 1994. Her comorbidities are kidney disease, high blood pressure, high cholesterol and a stroke.)

Another participant described her relationship with the parishioners.

> Yeah, talk about church things and issues and anything in the neighborhood that we need to talk about, you know? Just we need to look out for, we do that, but we don't talk into our personal business now. (75-year-old African American female with a master's degree living in Town B diagnosed with T2D for 15 years. Her comorbidities are high blood pressure, arthritis, and cataracts.)

Each participant identified what motivated him or her to manage their T2D. The participants were acutely aware of the need to improve their life. Based on the participants' conversation, they believed that it is essential to understand how their choices affect their quality of life.

> . . . it's just me, you know, 'cause it all boils down to me. It's what I decide to do, you know? Somebody can talk to me until they're blue in the face. I'm still going to do what [I] want to do. . . The thought of wanting to live and be healthy while you're living. Then you think you don't want to be an amputee. So, you want your limbs. You want your eyesight. And then you start thinking about people that's counting on you for certain things, like my son, who needs me to be around, so that's the main thing that makes it. (45-year-old African American female with a master's degree living in Town A diagnosed with T2D for 17 years. Her comorbidity is high blood pressure.)

A male participant discussed his involvement in his self-management behavior.

> It was because everything that - every time - this is something that I do remember clearly. It's treatable. IT's not curable, but it's treatable. You can live with this, a good, healthy life. And so that was my goal was that I wasn't going to wear diabetic shoes, I wasn't going to have my legs cut off, I wasn't going to go blind, I wasn't going to have my organs go crazy. (56-year-old African American man with some college experience living in Town A diagnosed with T2D for 11 years. Her comorbidity is bursitis.)

Neighborhood Characteristics

The neighborhood characteristics considered residential areas, food markets, medical offices, transportation, roads, lighting, access and availability to resources and how it impacts their daily management of their T2D. Physical neighborhood characteristics included lack of sidewalks and community resources. Physical neighborhood characteristics varied based on

residence (e.g., living in an apartment or home), proximity to social relationships (e.g., living with others or alone) and geographical location (e.g., rural or town). Several of the participants discussed feeling lonely due to the change in the neighborhood. For example, one of the participants described how her neighborhood has changed over the years due to the growing college population.

> No, I don't have any true friends in my neighborhood. We just have friends...Friends and neighbors. No, I think it's good. See, going from the old neighborhood, when I moved that way, everybody had children. Everybody's children are grown, and they've moved away. So, a lot of the people that's moving in there are young Hispanic people – couples. And there's few old couples down farther, but it's not – the neighborhood has changed, and there's not very many people besides the ones right across the street, the two houses that we've been in the neighborhood for over 25 years together. (75-year-old African American female with a master's degree living in Town B diagnosed with T2D for 15 years. Her comorbidities are high blood pressure, arthritis, and cataracts.)

The participants were dissatisfied with the antiquated transportation system. The participants reported feeling exceedingly dissatisfied with the roads and traffic conditions. The majority of the participants depend on others for transportation. Fortunately, the majority of the participants have access to transportation provided by the city of Town B. It offers participants access to social events, doctor's appointments, grocery stores, pharmacies, and shopping centers.

> I'm definitely dissatisfied with [the closest highway] because we've had several accidents with the other entrance up here with people going . . . they see the other entrance for you to come on up . . . We've had some terrible accidents there [street name] residents especially some of the elderly . . . Going out that way and got blindsided on one side. The car hit her and knocked her over across the median into another car. They put in this drive back here where you probably came in at that light hoping that would help people that traffic in and out of there. It has helped in a large way, but we are even now having accidents back there because a lot of them pull up there and ignore the light . . . Yeah. Public transportation even if you don't use the transportation they have at the very first entrance up there where I was just telling you about coming through that's a regular for Town B Transit. That's a regular stop and pick up . . . It's right there. You can just walk right out to the curb there and stand there, and flag them and they stop. (74-year-old African American man with two bachelor's degrees living

> in Town B diagnosed with T2D for 18 years. His comorbidities are stomach ulcers, blood pressure, and gout.)

An essential aspect of managing T2D is physical activity, which was more difficult for the participants in this study based on their location. The participants stated that they did not feel safe to exercise in specific areas. The weather also played a role in inactivity, especially the hot summers. During the summer months, the participants chose to walk at the local mall. Another barrier was the lack of sidewalks, creating a dangerous environment for exercising.

> I walk at the park. We have a walking track around the park . . . Yes, there's quite a few [people]. It's usually ladies, and that's why I feel safe. It's always somebody walking there every morning. They always walk, if the weather is permissible . . . We don't have sidewalks, but we have a park that's a block- right around the corner from my house, so that's where I usually walk at [the park]. I walk to the park and walk from, you know, around the park, but we don't have sidewalks yet. (75-year-old African American female with a master's degree living in Town B diagnosed with T2D for 15 years. Her comorbidities are high blood pressure, arthritis, and cataracts.)

Another participant discussed the importance of neighborhood being a facilitator or barrier to physical activity.

> It depends on where you are, but one of the things that we did do - because we live in the country, and we call coming to the city, coming to town, so that's why we choose to walk. If you want to go to town, the mall is the best place to exercise if you don't want to pay a membership. The thing of it is once you get home, you don't want to get back in your car and come in to exercise, so you just walk in the neighborhood, which is what we choose to do. If we didn't, I would probably do more at the mall. The mall is a safe, secure place. (56-year-old African American man with some college experience living in Town A diagnosed with T2D for 11 years. His comorbidity is bursitis.)

Photographs

Photographs were taken after interviewing the participants to understand the living conditions, barriers, and facilitators for T2D self-management behaviors. Locations closer to or in Town B -Town A , a populated area, were regularly maintaining and transformations were continually happening whereas locations in the rural, less populated areas of this area were less

maintained with poor infrastructure. Figure 1 showcased an apartment complex located in Town B, Texas, situated nine minutes from Town A. The exterior infrastructure appeared to be well-maintained with walkable trails, benches, shade, and trash cans. The apartment complex in an upper-middle-class neighborhood provided the participant with a safe, shaded location to exercise and socialize with neighbors, relatives or friends (see Appendix, Figure 1). However, participants who resided in low-income neighborhoods had barriers that prevented them from being physically active or socializing. The low-income neighborhoods that did not have sidewalks, which impeded the participants' ability to engage in no cost or low-cost activity such as walking (see Appendix, Figure 2). The picture demonstrated that not only was the exterior of the house 'run-down' but the neighborhood lacked sidewalks, and the roads were in need of repair. This picture supports the theme neighborhood characteristics and the need for the respondent to consider other option if he or she wanted to engage in physical activity. Besides impeding physical activity, there were other walkability issues. On the corner of the street, a 'school crossing sign,' which indicated a school was nearby. Children in the neighborhood would have to walk either in the street, on their neighbors' property, or driven to school (see Appendix, Figure 2). Figure 3 showed another participant's home from a different neighborhood with similar structural and neighborhood conditions. The roads were cracked, the home was dilapidated, and sidewalks were nonexistence. The photographs demonstrated the comparison that neighborhoods played a vital role in engaging in physical activity. The photographs showed that respondents living in a well-maintained apartment complex had a higher chance of being physically active and socializing than respondents living in neighborhoods that were deteriorating. It may be more adventurous for individuals diagnosed with T2D to live in the apartment complex where facility management was responsible for the property upkeep.

Community parks and neighborhood mall were the two most listed locations for exercising among participants living in neighborhoods that were not conducive to be physical active. The community parks were excellent sources for physical activity because participants walked, had opportunities to use additional recreational facilities (e.g., basketball), and socialized with family members and friends. In addition, community parks were free or low-cost for the residents. As shown in Figure 4, the community park (as mentioned by the participants) had a covered shelter where the participants 'took a break,' drank water, ate lunch, and took shade from the heat (see Appendix, Figure 4). The community park had a dirt walking trail (see Appendix, Figure 5). Since the trail was mainly constructed with dirt, it may be difficult for the participants with mobility issues to walk or run. However, the overall appearance of the park was regularly maintained (see Appendix, Figures 4 and 5). The second location was the neighborhood mall, located in Town A (see Appendix, Figure 6). The location of the neighborhood mall may make it difficult for participants living in rural Brazos Valley, but the participants also reported that the mall was the optimal location as it protected them from the hot weather and a getting sunburn, and from careless drivers due to lack of street lights and sidewalks. The mall's layout allows visitors to pass through stores, various restaurants from the food court (see Appendix, Figures 7 – 10). The food court offered several seating spaces for individuals to socialize with family members and friends (see Appendix, Figures 9 and 10). However, the neighborhood mall was also a potential nutritional impediment for participants diagnosed with T2D as the unhealthy food was readily available.

Participants obtained their groceries from different grocery stores or supermarkets based on their accessibility to various transportation. Town B -Town A had one of the largest supermarket chain stores in the area. However, the supermarkets differed in the layout of the

store, quality of the food, and services offered based on the neighborhoods' demographics and location. Participants in the study also shopped at smaller 'mom-and-pop' or 'cultural-specific' grocery stores. Photographs were taken from the major supermarket and smaller grocery stores. One of the participants reported visiting the 'cultural-specific' grocery store to help him spice up his diet. The 'cultural-specific' grocery store is located in Town A and offered the participant a variety of vegetables and fruits, seasonings and spices, household items, and culturally-specific meals he could not find in the major supermarket. (see Appendix, Figures 11 – 14). While the culturally-specific grocery store offered the participant shoppers a specific cultural experience he would not get from the supermarket, it lacks was typically "grubby' and unorganized (see Appendix, Figure 12 and 14). The floors were more likely to look dirty; however, the dining area did seem to be in a clean condition and offered shoppers a range of culturally-specific cuisine dishes and seating (see Appendix, Figure 12).

The student researcher went to two locations for the major supermarket, Town A and Town B. One of the large supermarkets (e.g., Store B) located at the center of Town B, Texas included sections for discounted items, fruits and vegetables, a coin-star machine, a pharmacy, a Chinese fast food restaurant, a dining area and healthy meals-to-go, in addition to the traditional supermarket layout (see Appendix, Figures 15 – 20). Store B offered discounted items and sales that were helpful for the participants who were living 'on a budget' (see Appendix, Figures 17 and 18). Store B was the supermarket with a fast food restaurant inside which can be a nutritional barrier for the participants diagnosed with T2D since it is fast, convenient, and inexpensive to obtain (see Appendix, Figure 19). However, Store B also had meal-kits that were healthy, easy-to-prepare or ready-to-cook items for the participants (see Appendix, Figure 20). Store A was located in the center of Town A and offers the participants the traditional grocery food sections,

a pharmacy, ready-to-go meal-kits, and money services (see Appendix, Figures 21 – 27). Store A offered discounted items and sales as well as healthy meal-kits (see Appendix, Figures 22 and 23 and 25). Frequently Store A offered a “Meal of the Week” with an in-store demonstration, sampling taste, and coupons for the ingredients needed to cook the mean. The meal-of-the week could be highly beneficial for the participants who are on a budget, do not know how to cook the meal, or wanted to try something new (see Appendix, Figure 27).

CHAPTER IV

DISCUSSION

This study explored the relationship between the critical aspects of social support and self-management behaviors among African-Americans diagnosed with T2D residing in rural and small towns Texas. Contrary to our findings (i.e., more women self-reporting T2D), research supports that the rate of prevalence of self-reported diagnosed T2D among Texans is 11.8 percent for males and 10.0 for females (CDC, 2013; Women's Health, 2016). However, the study will note that African American male participants (n = 2) were more likely not to participant in the study compared to African American female participants (n = 8). The reason for lack of participation stills remains a missing but efforts are needed to increase African American males' participation in social, and behavioral research. With the underrepresentation of this population, there is an emergent need to study African American males diagnosed with T2D to understand the perceived barriers and facilitators to self-management behaviors better. Furthermore, the majority of the study participants were overweight or obese, that is the average BMI was = 34.61 kg/m^2. Comparable to national data that reported 90 percent of individuals diagnosed with T2D were with overweight or obese (Obesity Society, 2015; Rogers et al., 2017).

In the qualitative phase of the study, the three themes that impacted how the participants managed their T2D were food and nutrition lifestyle, sociocultural factors, and neighborhood characteristics. The themes demonstrated the gravity of the management behaviors among the study populations.

Food and Nutrition

Marcy and colleagues (2011) found that cost was a significant factor in how the individuals' selected and consumed their food selection. Likewise, the study found that participants admit that the cost of healthy food was impeded their food selection. This theme is supported by research that found that participants report barriers to healthy eating to be the cost of healthy food, the temptation to eating unhealthy food, and stress-related inappropriate eating (Marcy et al., 2011). Contrarily to Marcy et al., the study could not confirm in food preparation was a barrier to a healthy diet. Although not discussed in the study, the majority of the participants were taught to cook at a young age. The study could not determine if food preparation or food selection was a barrier to an unhealthy diet. This study found participants coincided with the same barriers to healthy eating. These findings suggest that African-Americans are aware of the importance of healthy food, but struggle with food accessibility and availability. The study found that participants in this study experience nutritional barriers based on residential and grocery store geographical locations (Gebreab et al., 2017; Hoehner et al., 2011; Mundorf, Willits-Smith, and Rose, 2015). The majority of the participants (60%) depended on someone to take them to the grocery store. Participants food accessibility as the deciding factor because they shopping behaviors were based on the availability of significant others to provide transportation to the grocery stores. Nutrition was a multidimensional barrier that was widely reported to contribute difficulty in T2D management. Nutrition may be impacted by the availability of items sold within neighborhoods. Photographs supported this perception and confirmed the differences in store and food quality.

Sociocultural Factors

Social characteristics such as the lack of social support within neighbors, relatives, and healthcare providers, were either motivators or deterrents to T2D self-management behaviors. The findings in the study results agreed with Carter-Edwards et al. (2015) results. Carter-Edwards and colleagues (2015) found that African American women with T2D had unsupportive relationships with family members as it relates to T2D self-management behaviors. The lack of support further contributed to having difficult African American women in managing their T2D. The female participants in this study describe the burden of a being the primary caregiver to spouses, adult children, and grandchildren. This added responsibility impeded the female participants in managing their condition.

This theme found that have found that African American women report lower rates of positive social support sources compared to men. In addition, African American women reported having difficulty in self-management behaviors for T2D because of lack of understanding from family members and are less likely to ask for help (Tang et al., 2008; Carter-Edwards et al., 2004). This study found that 30% of the participants reported feeling at ease to talk to and call for help with five to eight relatives. Over half of the participants stated that they wanted help from family members in taking care of their feet, following a meal plan, and being physically active. In addition, sixty percent of the population desired to talk to someone about their feeling regarding T2D management issues. These findings demonstrate the high need that African Americans faced when dealing with the emotional trauma of T2D management behaviors. The participants desired to have the supportive relationship to help improve their self-management behaviors. Although research suggested that men were more likely to receive considerably more

social support, it could not be confirmed in this study due to the low male sample size (Tang et al., 2008).

Neighborhood Characteristics

This study found that quality of foods and services was based on geographical locations of supermarkets. Current research found that African-Americans and individuals residing in low-income communities were more likely to eat at fast food restaurants (Mundorf, Willits-Smith, and Rose, 2015; Gebreab et al., 2017). The lack of healthier options can impact the self-management behaviors among African Americans diagnosed with T2D. Research also found the association between low-income neighborhood and its characteristics as a barrier to performing self-care behaviors and attaining better health outcomes (Gebreab et al., 2007). The availability of healthy foods depends on the accessibility to the food environment. African American neighborhoods had fewer chain supermarkets compare to white neighborhoods (Powell, Slater, Mirtcheva, Bao, & Chaloupka, 2007). Filling the void of grocery stores in rural communities were convenience stores and gas stations which have food low nutritional values (Sharkey & Horel, 2008). In addition to spatial and neighborhood inequalities, the undergraduate student researcher found that access to transportation and distance to stores where influencing factors on nutritional behaviors.

Auchincloss and colleagues (2009) found that multiethnic participants T2D incidence rates and physical activity levels were predicated on individuals' neighborhood resources: worst (28.7), intermediate (27.0), and best (16.3). Neighborhoods with the most resources were more likely to support individuals' health behaviors (i.e., higher levels of neighborhood resources higher physical activity levels, healthier diets, and lower incidence rates of T2D; Auchincloss et al., 2009; Christine et al., 2015). Although the study did not quantitatively analyze or categorize

neighborhoods by categories, this study was able to support the neighborhood resources through photography and qualitative analysis within the study population. The participants who were able to access private transportation were more likely to increase the accessibility to quality foods and facilities for physical activity. The neighborhood characteristics that impeded the participants physical activity levels were transportation and inadequate neighborhood infrastructure. The study was able to find that neighborhood physical environments such as physical activity levels and access to healthy food, influenced the participants' activity levels and diet. Similarly, our participants suggested that improving infrastructure in their communities could lead to healthier dietary behavior and increased physical activity levels. In addition, the photographs displayed the quality of food based on neighborhood characteristics. While this study did not analyze racial disparities in food access, availability, and quality of food, it did provide evidence on those factors for African-Americans in rural Texas (Allen, 2007; Mundorf, Willits-Smith, and

Strengths

There were many strengths in this pilot study. First, the ability to investigate multiple dimensions of social and physical environments. The pilot study used research-driven generated photographs to illustrate the major themes from the participants' qualitative interview. Data collection aided the investigation in the understanding of the meaning and 'insider' experience of place and time concerning the participants.

Limitations

It should not be expected that the findings of this study represent the viewpoint of all African Americans living in rural and small-town Texas. The study had several limitations related to generalizability. First, the sample is a convenience sample of which the participants lived in either Bryan Texas or College Station Texas. Second, due to the difficulties with

recruiting male participants, these findings may not apply to African American men. Third, the undergraduate researcher was the only coder, some level of personal bias may influence the analysis. Finally, the nature of qualitative research is to explore the life of the target population, and the sample size is smaller than most qualitative studies. Since this study focuses on a small group of African Americans, the data does not equally represent other racial groups.

Conclusion

Based on the findings from this study, social support makes a significant impact on how participants self-manage their T2D. It affects their eating habits, physical activity habits, access to grocery stores and medical providers, access to help. Suggested improvements for this particular community would include nutrition classes, smoking cessation programs, infrastructure improvements (adding sidewalks and light poles), and educating family members and friends on T2D management and what they can do to help. Understanding what African Americans with T2D go through on a daily basis can help improve current medical care, community practice and social relationships as well as develop innovations for more effective T2D self-management techniques.

REFERENCES

Allen, T. D. (2007). Katrina: Race, class, and poverty: Reflections and analysis. *Journal of Black Studies.* Retrieved from DOI: 10.1177/0021934706296184.

American Diabetes Association. (2013). *Blood glucose control and exercise.* Retrieved from http://www.diabetes.org/food-and-fitness/fitness/get-started-safely/blood-glucose-control-and-exercise.html.

American Diabetes Association. (2015). The cost of diabetes. Retrieved from http://www.diabetes.org/advocacy/news-events/cost-of-diabetes.html.

American Diabetes Association. (2017). *Diagnosing diabetes and learning about prediabetes.* Retrieved from http://www.diabetes.org/diabetes-basics/diagnosis/.

American Diabetes Association. (2017). *Genetics of diabetes.* Retrieved from http://www.diabetes.org/diabetes-basics/genetics-of-diabetes.html?referrer=https://www.google.com/.

American Diabetes Association. (2017). *Statistics about diabetes.* Retrieved from http://www.diabetes.org/diabetes-basics/statistics/.

Auchincloss, A. H., Roux, A. V. D., Mujahid, M. S., Shen, M., Bertoni, A. G., & Carnethon, M. R. (2009). Neighborhood resources for physical activity and healthy foods and incidence of type 2 diabetes mellitus: The Multi-Ethnic Study of Atherosclerosis. *Archives of internal medicine, 169*(18), 1698-1704.

Berkman, L. F., & Glass, T. (2000). Social integration, social networks, social support, and health. *Social epidemiology, 1,* 137-173. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3833829/pdf/S93.pdf.

Berkman, L. F., & MacIntyre, S. (1997). The measurement of social class in health studies: Old measures and new formulations. *IARC Scientific Publications, 138,* 51-64.

Boyce, C., & Neale, P. (2006). Conducting in-depth interviews: A guide for designing and Conducting in-depth interviews for evaluation input.

Braveman, P., Gottlieb, L. The Social Determinants of Health: It's Time to Consider the Causes of the Causes. *Public Health Reports.* 2014; 129(2):19-31. Retrieved from http://journals.sagepub.com/doi/pdf/10.1177/00333549141291S206.

Carter-Edwards, L., Skelly, A.H., Cagle, C.S., & Appel, S.J. (2004). "They care but don't understand": family support of African American women with type 2 diabetes. *The Diabetes Educator, 30*(3), 493-501. http://journals.sagepub.com/doi/abs/10.1177/014572170403000321.

Centers for Disease Control and Prevention. (2013). *Prevalence of self-reported diagnosed diabetes in adults, aged 18 years or older, United States, 2013.* Retrieved from https://nccd.cdc.gov/Toolkit/DiabetesBurden/Prevalence.

Centers for Disease Control and Prevention. (2014). *Diseases and conditions.* Retrieved from https://www.cdc.gov/features/diseasesconditions.html.

Centers for Disease Control and Prevention. (2014). *More than 29 million Americans have diabetes; 1 in 4 doesn't know.* Retrieved from https://www.cdc.gov/media/releases/2014/p0610-diabetes-report.html.

Centers for Disease Control and Prevention. (2015). *Age-adjusted rates of diagnosed diabetes per 100 civilian, non-institutionalized population, by sex, united states, 1980-2014.* Retrieved from https://www.cdc.gov/diabetes/statistics/prev/national/figbysex.htm.

Centers for Disease Control and Prevention. (2015). *Diabetes 2014 report card.* Retrieved from www.cdc.gov/diabetes/library/reports/congress.html.

Centers for Disease Control and Prevention. (2016). *Adult obesity prevalence maps.* Retrieved from https://www.cdc.gov/obesity/data/prevalence-maps.html.

Centers for Disease Control and Prevention. (2016). *Diabetes.* Retrieved from https://www.cdc.gov/chronicdisease/resources/publications/aag/diabetes.htm.

Centers for Disease Control and Prevention. (2016). *Diabetes economic burden.* Retrieved from https://nccd.cdc.gov/Toolkit/DiabetesBurden/Home/Economic.

Centers for Disease Control and Prevention. (2016). Prediabetes. Retrieved from https://www.cdc.gov/diabetes/basics/prediabetes.html.

Centers for Disease Control and Prevention. (2017). *Childhood obesity facts.* Retrieved from https://www.cdc.gov/healthyschools/obesity/facts.htm.

Centers for Disease Control and Prevention. *Diabetes.* Retrieved from https://www.cdc.gov/media/presskits/aahd/diabetes.pdf.

Christine, P. J., Auchincloss, A. H., Bertoni, A. G., Carnethon, M. R., Sánchez, B. N., Moore, K., ... & Roux, A. V. D. (2015). Longitudinal associations between neighborhood physical and social environments and incident type 2 diabetes mellitus: The Multi-Ethnic Study of Atherosclerosis (MESA). *JAMA Internal Medicine, 175*(8), 1311-1320.

Chronister, J. A., Chan, F., da Silva Cardoso, E., Lynch, R. T., & Rosenthal, D. A. (2008). The evidence-based practice movement in healthcare: Implications for rehabilitation. *Journal of Rehabilitation, 74*(2), 6.Retireved from http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=1&sid=d5fef2a7-77c0-4e4d-9f52-ba885fb35a52%40sessionmgr4007.

Çolak, T. K., Acar, G., Dereli, E. E., et al. Association between the physical activity level and the quality of life of patients with type 2 diabetes mellitus. *Journal of physical therapy science*. 2015; *28*(1), 142-147. Retrieved from https://doi.org/10.1589/jpts.28.142.

Connell, C. M., Fisher, E. B., & Houston, C. A. (1992). Relationships among social support, diabetes outcomes, and morale for older men and women. *Journal of Aging and Health, 4*(1), 77-100. 10.1177/089826439200400105

Creswell, J. W., & Plano Clark, V. (2007). *Designing and conducting mixed methods research*. Thousand Oaks: Sage Publications.

Cuadraz, G.H., & Uttal, L. (1999). Intersectionality and in-depth interviews: Methodological strategies for analyzing race, class, and gender. Race, Gender, & Class, 156-186.

Diabetes Research Institute Foundation. (2016). *What is type 2 diabetes?* Retrieved from https://www.diabetesresearch.org/what-is-type-two-diabetes.

Ershow, A. G. Environmental influences on development of type 2 diabetes and obesity: challenges in personalizing prevention and management. *Journal of Diabetes Science and Technology*. 2009; 3(4): 727-734. Retrieved from http://journals.sagepub.com/doi/pdf/10.1177/193229680900300418.

Fagot-Campagna, A., Pettitt, D.J, Burrows N.R., et al. Type 2 diabetes among North American children and adolescents: an epidemiologic review and a public health perspective. *Journal of Pediatrics.* 2000; 136 (5): 664-72. Retrieved from https://doi.org/10.1067/mpd.2000.105141.

Frey, L. R., Botan, C. H., & Kreps, G. L. (2000). Naturalistic inquiry. Investigating communication: An introduction to research methods, 257-285.

Gebel, Erika. (2012). *More kids than ever have type 2 diabetes.* Diabetes Forecast. Retrieved from http://www.diabetesforecast.org/2012/nov/more-kids-than-ever-have-type-2-diabetes.html?referrer=https://www.google.com/.

Gebreab, S. Y., Hickson, D. A., Sims, M., Wyatt, S. B., Davis, S. K., Correa, A., & Diez-Roux, A. V. (2017). Neighborhood social and physical environments and type 2 diabetes mellitus in African Americans: The Jackson Heart Study. *Health & place*, *43*, 128-137. Retrieved from https://doi.org/10.1016/j.healthplace.2016.12.001.

Glasgow, R. E., & Toobert, D. J. (1988). Social environment and regimen adherence among type II diabetic patients. *Diabetes care*, *11*(5), 377-386.Retrieved from https://doi.org/10.2337/diacare.11.5.377.

Grant, S. F. (2013). Genetics of obesity and type 2 diabetes in African Americans. *Journal of obesity, 2013*. Retrieved from http://dx.doi.org/10.1155/2013/396416.

Green. J., & Thorogood, N. (2004). Principles and approaches in qualitative health research. In Green J, Thorogood N, (Eds.), Qualitative Methods for Health Research, (1st ed., pp. 1–26). London: Sage Publications.

Harvard T.H. Chan School of Public Health. *Simple steps to preventing diabetes.* Retrieved from https://www.hsph.harvard.edu/nutritionsource/diabetes-prevention/preventing-diabetes-full-story/.

Hoehner, C.M., Handy, S.L., Yan, Y., Blair, S.N., Berrigan, D. Association between neighborhood walkability, cardiorespiratory fitness and body-mass index. *Social Science and Medicine*. 2011; 73(12): 1707-1716. Retrieved from https://doi.org/10.1016/j.socscimed.2011.09.032.

House, J. S., Landis, K. R., & Umberson, D. (1988). Social relationships and health. *Science, 241*(4865), 540-545. Retrieved from http://science.sciencemag.org/content/sci/241/4865/540.full.pdf; DOI: 10.1126/science.3399889.

Hu, F. B., Manson, J. E., Stampfer, M. J., Colditz, G., Liu, S., Solomon, C. G., & Willett, W. C. (2001). Diet, lifestyle, and the risk of type 2 diabetes mellitus in women. *New England journal of medicine, 345*(11), 790-797. Retireved from DOI: 10.1056/NEJMoa010492.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Thousand Oaks, CA: Sage Publications.

Lubben, J., Blozik, E., Gillmann, G., Iliffe, S., von Rentein Kruse, W., Beck, J. C., & Stuck, A. E. (2006). Performance of an abbreviated version of the Lubben Social Network Scale among three European community-dwelling older adult populations. *The Gerontologist*, 46(4), 503–513.

Marcy, T.R, Britton, M.L., Harrison, D. Identification of barriers to appropriate dietary behavior in low-income patients with type 2 diabetes mellitus. *Diabetes Therapy.* 2011; 2(1): 9-19. Retrieved from http://journals.sagepub.com/doi/pdf/10.1177/193229680900300418.

Marshall, M. C. (2005). Diabetes in African Americans. *Postgraduate medical journal, 81*(962), 734-740. Retrieved from http://dx.doi.org/10.1136/pgmj.2004.028274.

Mayo Clinic. (2016). *Type 2 diabetes.* Retrieved from http://www.mayoclinic.org/diseases-conditions/type-2-diabetes/symptoms-causes/dxc-20169861.

Mayo Clinic. (2016). *Type 2 diabetes.* Retrieved from https://www.diabetesresearch.org/what-is-type-two-diabetes.

Mokdad, A. H., Bowman, B. A., Ford, E. S., Vinicor, F., Marks, J. S., & Koplan, J. P. (2001). The continuing epidemics of obesity and diabetes in the United States. *Jama*, *286*(10), 1195-1200. Retireved from https://jamanetwork.com/journals/jama/fullarticle/194179.

Mundorf, A. R., Willits-Smith, A., & Rose, D. (2015). 10 years later: Changes in food access disparities in New Orleans since Hurricane Katrina. Journal of Urban Health: Bulletin of the New York Academy of Medicine, 92(4), 605-610. doi:10.1007/s11524-015-9969-9.

National Institute of Diabetes and Digestive and Kidney Diseases. (2016). *What is diabetes?* Retireved from https://www.niddk.nih.gov/health-information/diabetes/overview/what-is-diabetes.

Obesity Society. (2015). *Your weight and diabetes.* Retrieved from http://www.obesity.org/content/weight-diabetes.

Powell, L. M., Slater, S., Mirtcheva, D., Bao, Y., & Chaloupka, F. J. (2007). Food store availability and neighborhood characteristics in the United States. *Preventive Medicine*, *44*(3), 189-195.

Pulgaron, E.R., Delamater, A.M. Obesity and type 2 diabetes in children: epidemiology and treatment. *Current Diabetes Reports*. 2014; 14: 508. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/24919749.

Rogers, J.Z., Still, C.D. *Obesity and type 2 diabetes.* Obesity Action Coalition. Retrieved from http://www.obesityaction.org/educational-resources/resource-articles-2/obesity-related-diseases/obesity-and-type-2-diabetes.

Rotberg, B., Junqueira, Y., Gosdin, L., et al. The Importance of Social Support on Glycemic Control in Low-income Latinos With Type 2 Diabetes. *American Journal of Health Education.* 2016; 47(5): 279-286. http://www.tandfonline.com/doi/full/10.1080/19325037.2016.1203838?scroll=top&needAccess=true.

Schisler, J. C., Charles, P. C., Parker, J. S., Hilliard, E. G., Mapara, S., Meredith, D., ... & Patterson, C. (2009). Stable patterns of gene expression regulating carbohydrate metabolism determined by geographic ancestry. *PLoS One, 4*(12), e8183. Retrieved from https://doi.org/10.1371/journal.pone.0008183.

Sharkey, J. R., & Horel, S. (2008). Neighborhood socioeconomic deprivation and minority composition are associated with better potential spatial access to the ground-truthed food environment in a large rural area. *The Journal of Nutrition, 138*(3), 620-627.

Silverman, D. (2015). *Interpreting qualitative data*. Thousand Oaks, CA: Sage Publications.

Sousa, V. D., Zauszniewski, J. A., Musil, C. M., McDonald, P. E., & Milligan, S. E. (2004). Testing a conceptual framework for diabetes self-care management. *Research and Theory for Nursing Practice, 18*(4), 293. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/15776752.

Squires, D., Anderson, C. (2015). U.S. health care from a global perspective. *The commonwealth fund.* Retrieved from http://www.commonwealthfund.org/publications/issue-briefs/2015/oct/us-health-care-from-a-global-perspective.

Strom, J.L., Egede, L.E. The impact of social support on outcomes in adult patients with type 2 diabetes: a systematic review. *Current Diabetes Reports.* 2012; 12(6): 769-81. https://www.ncbi.nlm.nih.gov/pubmed/22949135.

Tang, T.S., Brown, M.B., Funnell, M.M., & Anderson, R.M. (2008). Social support, quality of life, and self-care behaviors among African Americans with type 2 diabetes. *The Diabetes Educator, 34(*2), 266-276. http://journals.sagepub.com/doi/abs/10.1177/0145721708315680.

Texas Department of State Health Services, Office of Surveillance, Evaluation and Research . (2013). The Burden of Diabetes In Texas . Retrieved from file:///C:/Users/miryan.jara2310/Downloads/DiabetesBurdenReport2013%20(1).pdf.

Texas Health and Human Services. (2015). *2013 diabetes fact sheet-texas.* Retrieved from https://www.dshs.texas.gov/diabetes/tdcdata.shtm.

Texas Health and Human Services. (2016). *Texas Behavioral Risk Factor Surveillance System.* Retrieved from https://www.dshs.texas.gov/chs/brfss/.

The State of Obesity. (2016). *Diabetes in the united states.* Retrieved from https://stateofobesity.org/diabetes/.

The State of Obesity. (2017). *The state of obesity in texas.* Retrieved from http://stateofobesity.org/states/tx/.

Thompson, T., Rodebaugh, T.L., Perez, M., et al. Influence of neighborhood-level factors on social support in early-stage breast cancer patients and controls. *Social Science and Medicine.* 2016; 156: 55-63. Retrieved from https://doi.org/10.1016/j.socscimed.2016.03.023.

Toobert, D. J., & Glasgow, R. E. (1994). Assessing diabetes self-management: The summary of diabetes self-care activities questionnaire. *Handbook of Psychology and Diabetes: A Guide to Psychological Measurement in Diabetes Research and Practice,* 351–375.

Toobert, D.J., Hampson, S.E., & Glasgow, R.E. (2000). The summary of diabetes self-care activities measure: results from 7 studies and a revised scale. *Diabetes Care*, 23, 943-950.

Toljamo, M., & Hentinen, M. (2001). Adherence to self-care and social support. *Journal of Clinical Nursing*, *10*(5), 618-627. Retrieved from DOI: 10.1046/j.1365-2702.2001.00520.x.

White, A.M., Philogene, G.S., Fine, L., Sinha, S. Social Support and Self-Reported Health Status of Older Adults in the United States. *American Journal of Public Health.* 2009; 99(10): 1872-1878. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2741527/.

Whittemore, R., Melkus, G. D. E., & Grey, M. (2005). Metabolic control, self-management and psychosocial adjustment in women with type 2 diabetes. *Journal of clinical nursing*, *14*(2), 195-203. Retrieved from .DOI: 10.1111/j.1365-2702.2004.00937.x.

Women's Health- Office on Women's Health U.S. Department of Health and Human Services. (2016). *Diabetes.* Retrieved from https://www.womenshealth.gov/publications/our-publications/fact-sheet/diabetes.html.

World Health Organization. (2017). *Diabetes.* Retrieved from http://www.who.int/mediacentre/factsheets/fs312/en/.

APPENDIX

Tables

Table 1. Participant Demographic Characteristics (N = 10)

Variables	**N**	**%**	**M (*SD*)**
City			
Bryan	8	80	
College Station	2	20	
Gender			
Male	2	20	
Female	8	80	
Age			58.70 (10.96)
Years of Type 2 Diabetes Diagnosis			10.90 (6.67)
Body Mass Index			34.61 (7.69)
Marital Status			
Single, never married	1	10	
Married	4	40	
Widowed	3	30	
Divorced	2	20	
Highest Level of Education			
HS Diploma or GED	3	30	
Vocational School Degree	1	10	
Some College	1	10	
Associate Degree	1	10	
Bachelor’s Degree	2	20	
Master’s Degree	2	20	
Income			
$5,000 to $9,999	2	20	
$15,000 to $19,999	3	30	
$25,000 to $34,999	1	10	
$35,000 to $49,999	1	10	
$50,000 to $74,999	1	10	
Don't Know or Refused	2	20	
Number of Health Conditions			3.30 (2.11)

Table 2. Familial Support (N =10)

Family Member	**Support (%)**	
	Yes	No
Spouse	75	25
Daughter	40	60
Son	10	90

Table 3. Summary of Diabetes Self-Care Activities (N = 10)

Variable	**Mean Days**	**SD**
Diet		
Followed a healthful eating plan	3.50	3.31
Followed eating plan	3.50	3.31
Serving of fruits and vegetables	5.10	2.89
High-fat foods	3.00	2.98
Space carbohydrates evenly	3.10	2.92
Exercise		
Thirty minutes a day	2.70	2.50
Blood sugar testing		
Test blood sugar	3.40	3.24
Followed doctor recommendation	3.40	3.24
Foot care		
Check feet	4.00	3.57
Inspect shoes	3.11	3.69
Take recommend medications	4.00	3.57

Table 4. Smoking (N = 10)

Variable	**N**	**%**
Ever smoke a cigarette (Yes)	3	30
How many cigarettes smoke a day		
One	1	10
Seven	1	10
Thirty	1	10
If smoke, counsel to quit	1	10
Doctor asked about smoking (Yes)	7	70

Table 5. Lubben Social Network Scale: Relatives (N = 10)

Variables	**N**	**%**
See or talk at least once a month		
3 – 4	3	30
5 – 8	2	20
9 or more	5	50
See or talk from relative		
A few times a month	1	10
Daily	9	90
Help manage type-2 diabetes		
Yes	5	50
No	5	50
Talk about private matters		
None or 0	2	20
1	1	10
2	2	20
3 – 4	1	10
5 – 8	3	30
9 or more	1	10
Can call for help		
None or 0	0	0
1	2	20
2	1	10
3 – 4	3	30
5 – 8	2	20
9 or more	2	20
Important decision to make		
Never	1	10
Seldom	1	10
Sometimes	3	30
Often	2	20
Always	3	30
Relative available to talk		
Never	1	10
Seldom	0	0
Sometimes	2	20
Often	2	20
Always	5	50

Table 6. Lubben Social Network Scale: Neighbors (N = 10)

Variables	**N**	**%**
See or talk at least once a month		
None or 0	1	10
1	1	10
2	3	30
3 – 4	2	20
5 – 8	2	20
9 or more	1	10
See or talk from neighbor		
Monthly	1	10
A few times a month	1	10
Weekly	1	10
A few times a week	4	40
Daily	2	20
Missing	1	10
Help manage type-2 diabetes		
Yes	1	10
No	9	90
Talk about private matters		
None or 0	4	40
1	2	20
2	2	20
3 – 4	2	20
Can call for help		
None or 0	3	30
1	2	20
2	3	30
3 – 4	1	10
5 – 8	1	10
Important decision to make		
Never	3	30
Sometimes	3	30
Often	1	10
Always	3	30
Neighbor available to talk		
Never	5	50
Seldom	1	10
Always	3	30
Missing	1	10

Table 7. Lubben Social Network Scale: Friends (N = 10)

Variables	**N**	**%**
See or talk at least once a month		
None or 0	1	10
1	1	10
2	2	20
3 – 4	4	40
5 – 8	1	10
9 or more	1	10
See or talk from friend		
Less than monthly	1	10
Weekly	2	20
A few times a month	5	50
Daily	2	20
Help manage type-2 diabetes		
Yes	4	40
No	6	60
Talk about private matters		
None or 0	1	10
1	2	20
2	2	20
3 – 4	3	30
5 – 8	1	10
Missing	1	10
Can call for help		
None or 0	1	10
1	2	20
2	2	20
3 – 4	3	30
5 – 8	1	10
9 or more	1	10
Important decision to make		
Never	1	10
Sometimes	4	40
Often	1	10
Always	3	30
Friend available to talk		
Never	1	10
Sometimes	4	40
Often	2	20
Always	3	30

Table 8: Tangible Social Support Provided (N = 10)

Variable	**N**	**%**
Does anybody rely on you to do something for them each day?		
Yes	6	60
No	4	40
Do you help anybody with things like shopping, filling out forms,		
Never	3	30
Sometimes	2	20
Often	1	10
Always	4	40
Do you live alone or with other people?		
Live alone	3	30
Live with other relatives or friends	4	40
Live with spouse	3	30

Table 9. Diabetes-Specific Support Desired: Family Members and Friends (N = 10)

Variables	N	%
Family Members		
Meal plan		
Strongly disagree	4	40
Neutral	1	10
Strongly agree	5	50
Medication		
Strongly disagree	4	40
Somewhat agree	1	10
Neutral	2	20
Strongly agree	3	30
Foot care		
Strongly disagree	4	40
Strongly agree	5	50
Missing	1	10
Exercise		
Strongly disagree	2	20
Somewhat disagree	1	10
Somewhat agree	2	20
Strongly agree	5	50
Test blood sugar		
Strongly disagree	4	40
Somewhat disagree	1	10
Neutral	1	10
Somewhat agree	3	30
Strongly agree	1	10
Feelings about diabetes		
Strongly disagree	3	30
Somewhat agree	1	10
Strongly agree	6	60
Friends		
Meal plan		
Strongly disagree	4	40
Neutral	1	10
Strongly agree	5	50
Medication		
Strongly disagree	4	40

Table 9. Diabetes-Specific Support Desired: Family Members and Friends (N = 10) contd.

Somewhat agree	1	10
Neutral	2	20
Strongly agree	3	30
Foot care		
Strongly disagree	4	40
Strongly agree	5	50
Missing	1	10
Exercise		
Strongly disagree	2	20
Somewhat disagree	1	10
Somewhat agree	2	20
Strongly agree	5	50
Test blood sugar		
Strongly disagree	6	60
Neutral	1	10
Somewhat agree	2	20
Missing	1	10
Feelings about diabetes		
Strongly disagree	3	30
Somewhat disagree	1	10
Somewhat agree	4	40
Strongly agree	1	10
Missing	1	10

Table 10. Diabetes-Specific Support Received: Family Members and Friends (N = 10)

Variables	**N**	**%**
Family Members		
Meal plan		
Strongly disagree	2	20
Somewhat disagree	1	10
Somewhat agree	4	40
Strongly agree	2	20
Missing	1	10
Medication		
Strongly disagree	3	30
Somewhat disagree	1	10
Somewhat agree	3	30
Strongly agree	2	20
Missing	1	10
Foot care		
Strongly disagree	2	20
Somewhat disagree	2	20
Neutral	1	10
Somewhat agree	1	10
Strongly agree	2	20
Missing	2	20
Exercise		
Strongly disagree	3	30
Neutral	2	20
Somewhat agree	4	40
Missing	1	10
Test blood sugar		
Strongly disagree	4	40
Neutral	1	10
Somewhat agree	3	30
Strongly agree	1	10
Missing	1	10
Feelings about diabetes		
Strongly disagree	3	30
Neutral	1	10
Somewhat agree	3	30
Strongly agree	2	20

Table 10. Diabetes-Specific Support Received: Family Members and Friends (N = 10) contd.

Missing	1	10
Friends		
Meal plan		
Strongly disagree	5	50
Neutral	1	10
Somewhat agree	4	40
Medication		
Strongly disagree	6	60
Somewhat disagree	1	10
Neutral	1	10
Somewhat agree	1	10
Strongly agree	1	10
Foot care		
Strongly disagree	5	50
Somewhat disagree	1	10
Neutral	2	20
Somewhat agree	1	10
Missing	1	10
Exercise		
Strongly disagree	6	60
Neutral	1	10
Somewhat agree	2	20
Strongly agree	1	10
Test blood sugar		
Strongly disagree	7	70
Somewhat disagree	1	10
Neutral	1	10
Somewhat agree	1	10
Feelings about diabetes		
Strongly disagree	3	30
Somewhat disagree	1	10
Somewhat agree	5	50
Strongly agree	1	10

Table 11. Diabetes-Specific Support Acceptance (N = 10)

Variables	**N**	**%**
Family		
Accept my diabetes and me		
Strongly agree	10	100
Feel uncomfortable about me because of my diabetes		
Strongly disagree	10	100
Encourage or reassure me about my diabetes		
Somewhat agree	2	20
Strongly agree	8	80
Discourage or upset me about my diabetes		
Strongly disagree	7	70
Somewhat Agree	3	30
Listen to me when I want to talk about my diabetes		
Strongly disagree	1	10
Somewhat agree	3	30
Strongly agree	6	60
Nag me about diabetes		
Strongly disagree	6	60
Somewhat disagree	1	10
Strongly agree	3	30
Missing	1	10

Table 12. Social Support – Direct Source of Help (N = 30)

Variable	**N**	**%**
Help from spouse		
Yes	3	30
No	7	70
Help from son/daughter		
Yes	5	50
No	5	50
Help from other family members		
Yes	0	0
No	10	100
Help from friends		
Yes	1	10
No	9	90
Help from paid helper		
Yes	0	0
No	10	100
Help from doctor		
Yes	3	30
No	7	70
Help from nurse		
Yes	2	20
No	8	80
Help from case manager		
Yes	0	0
No	10	100
Help from other health professional		
Yes	0	0
No	10	100
Help from no one		
Yes	4	10
No	6	60

Table 13. Social Support – Type of Help (N=10)

Variables	**N**	**%**
Assist in obtaining medications used		
Yes	6	60
No	3	30
Don't Know	1	10
Set out medication		
Yes	2	20
No	8	80
Assist in housework		
Yes	4	40
No	6	60
Take anywhere that is difficult to get to alone		
Yes	5	50
No	5	50
Help in other ways		
Yes	3	30
No	6	60
Missing	1	10
Get medical advice or information		
Yes	6	60
No	2	20
Missing	2	20
Give emotional support		
Yes	6	60
No	4	40

Figures

Figure 1. Resident apartment complex.

Figure 2. Participant house.

Figure 3. Participant house.

Figure 4. Covered area in park.

Figure 5. Park trail.

Figure 6. Neighborhood mall.

Figure 7. Neighborhood mall entrance.

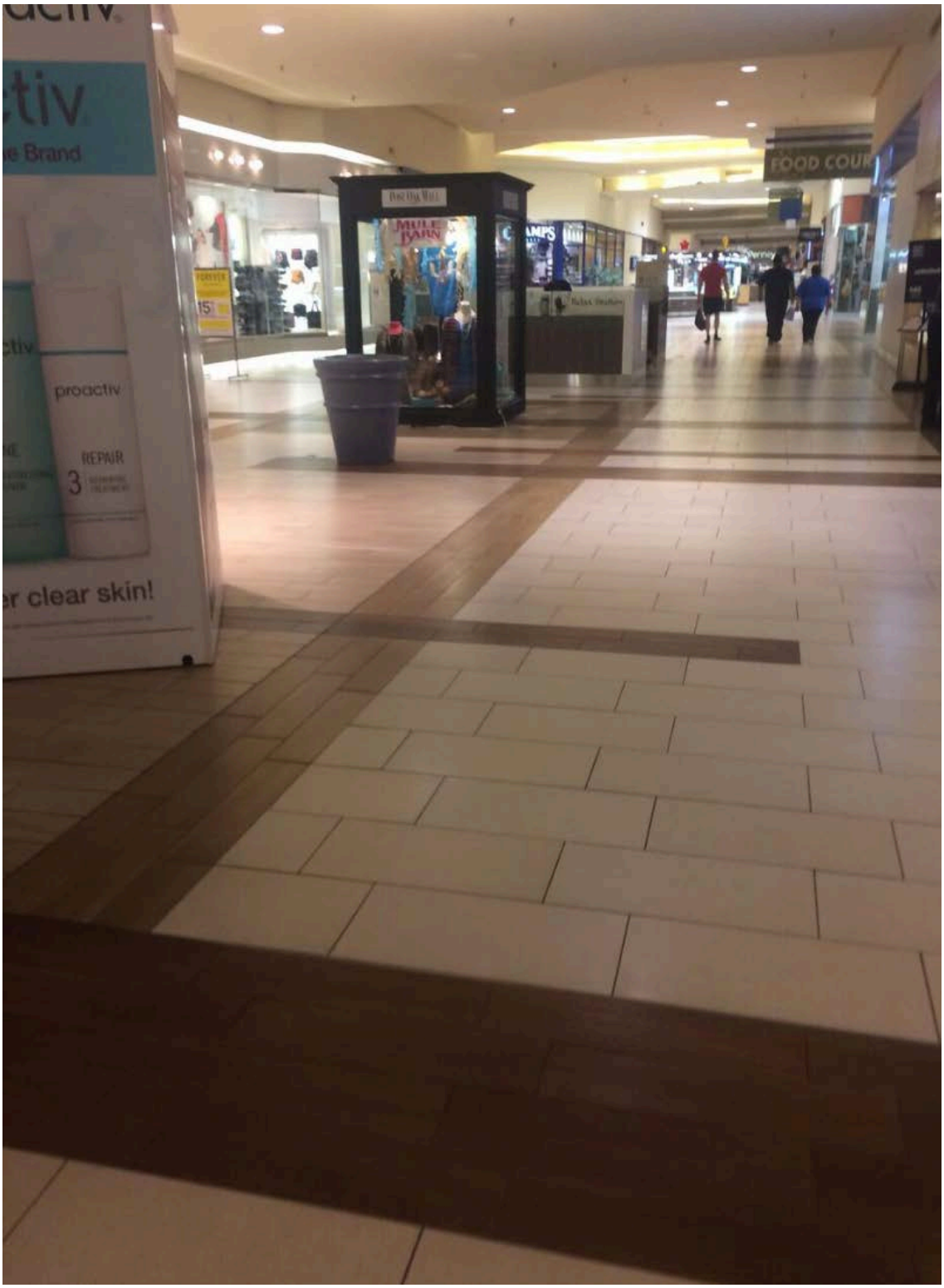

Figure 8. Neighborhood mall.

Figure 9. Food court inside neighborhood mall.

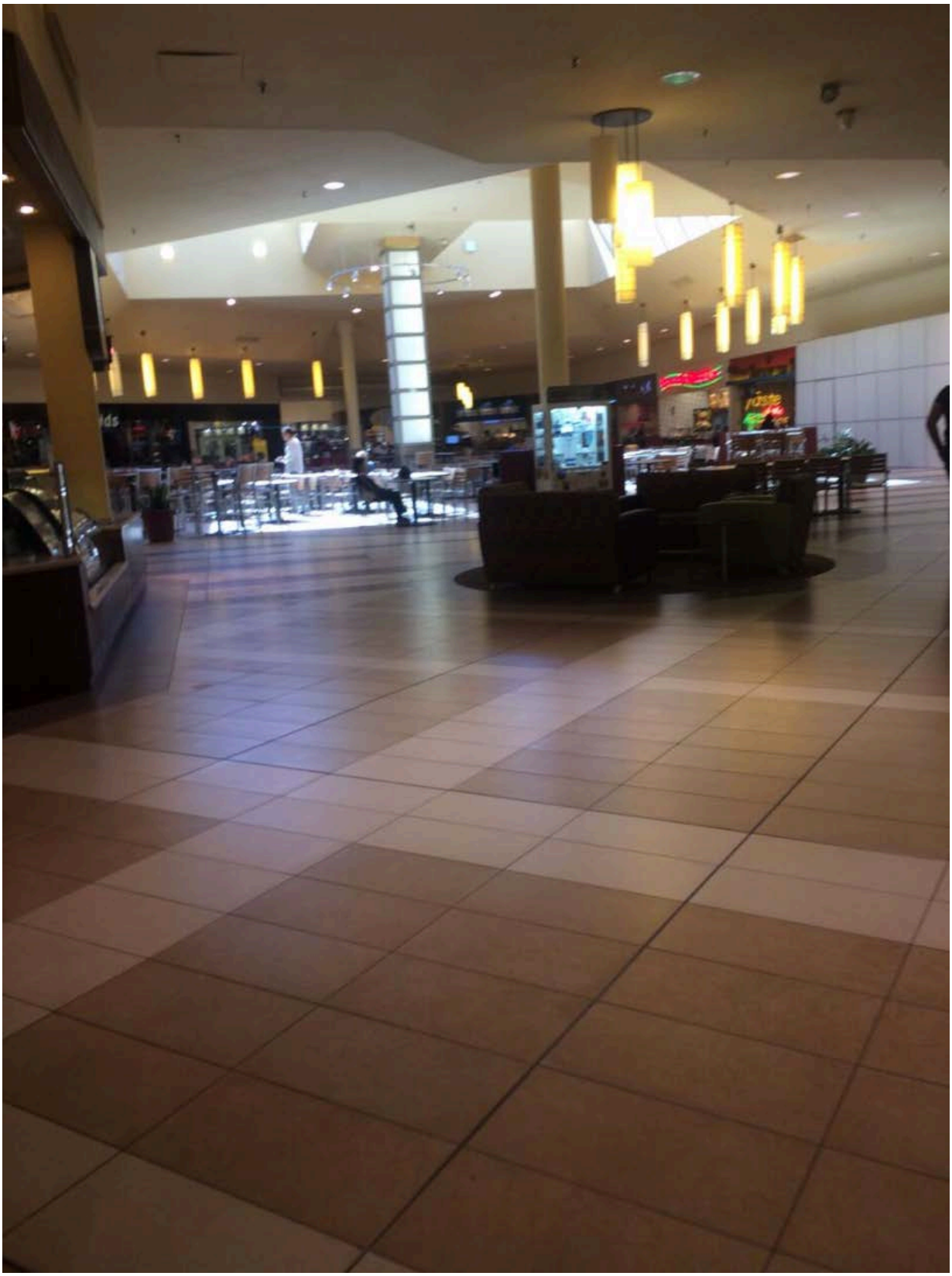

Figure 10. Food court in neighborhood mall.

Figure 11. Vegetables at the culturally-specific grocery store.

Figure 12. Dining area at the culturally-specific grocery store.

Figure 13. Frozen fish and meat section at the culturally-specific grocery store.

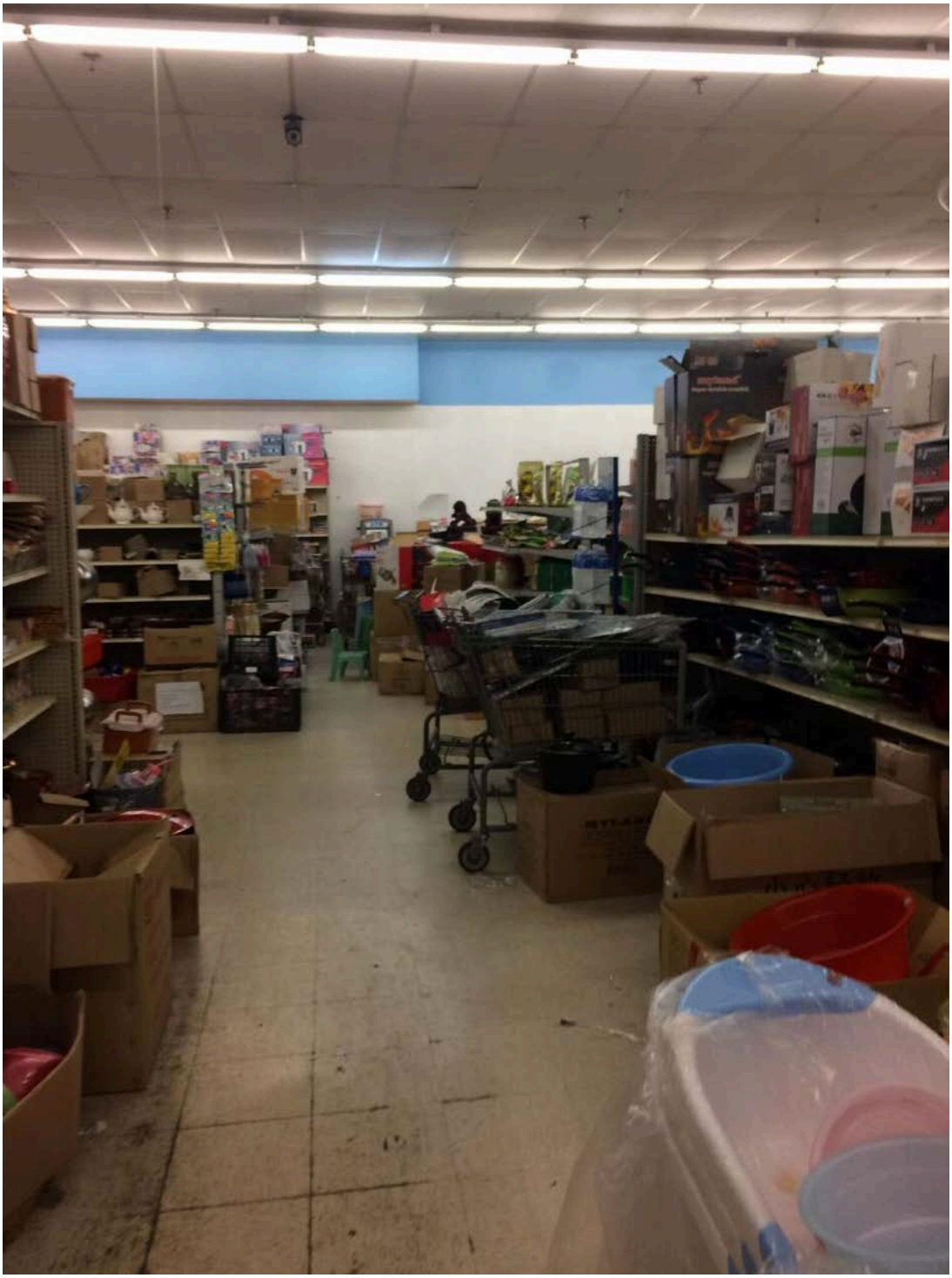

Figure 14. Aisle in the culturally-specific grocery store.

Figure 15. Produce section inside Store B.

Figure 16. Bitten vegetable inside Store B.

Figure 17. Discounted section inside Store B.

Figure 18. Sales in produce section inside Store B.

Figure 19. Chinese fast food diner inside Store B.

Figure 20. Ready to go meal kits inside Store B.

Figure 21. Produce section inside Store A.

Figure 22. Meal kits from Store A.

Figure 23. Ready-to-go meal kits Store A.

Figure 24. Meat aisle inside Store A.

Figure 25. Ready-to-go meal kits inside Store A.

Figure 26. Money services inside Store A.

Figure 27. "Meal of the Week" inside Store A.