

# A current review of effective interventions to reduce racial/ethnic disparities in type 2 diabetes mellitus

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A Current Review of Effective Interventions to Reduce Racial/Ethnic Disparities in Type 2  
Diabetes Mellitus

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The University of Toledo  
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## Dedication

This paper is dedicated to my family and friends for their continual support, inspiration, and encouragement.

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## **Chapter 1**

### **Introduction**

According to the 2011 National Diabetes Fact Sheet, 25.8 million children and adults in the United States have diabetes. Based on testing measures of fasting glucose and A1C, 79 million are prediabetic. The Centers for Disease Control and Prevention (CDC) reported that diabetes is the seventh leading cause of death in the United States (CDC, 2011). According to the Diabetes Association of Greater Cleveland (2007), diabetes is the fifth leading cause of death in Ohio. Diabetes is a chronic disease without a cure that can affect anyone despite age, race/ethnicity, or gender (CDC-Diabetes, 2011; Mayo Clinic, 2011).

National survey data from 2007-2009 indicated that the racial distribution of diabetes prevalence was 7.1% of non-Hispanic whites, 8.4% of Asian Americans, 11.8% of Hispanics, and 12.6% of non-Hispanic blacks. In 2010, approximately 11.3% of people aged 20 years and older and 26.9% of people aged 65 years and older had diabetes. The increasing incidence of diabetes has led the CDC to estimate that by 2050, 1 in 3 Americans will develop diabetes, resulting in a possible 10-15 year reduction in lifespan (CDC, 2010).

Problem statement: Diabetes is the seventh leading cause of death nationally and therefore it is a significant area of focus in the United States. Racial and ethnic minority groups carry a disproportionate burden of diabetes. The CDC has estimated that by 2050 that greater than 20 percent of the US population will represent people from different cultural backgrounds (CDC, 2011). As the US population continues to become increasingly diverse, the incidence of diabetes will increase. Therefore it is imperative that healthcare providers are aware of applicable effective self-management interventions for racial/ethnic minorities with type 2 diabetes. In

addition, it is important that efforts toward reducing and eliminating health care disparities are effective and continue to improve healthcare outcomes (CDC, 2011).

**Purpose:** The literature review was to increase the awareness of current effective interventions that contribute to decreasing racial/ethnic health disparities in type 2 diabetes mellitus care. In addition, provide current and future concrete considerations for primary care providers in helping to diminish and eliminate racial/ethnic disparities in diabetes care.

**Scope:** This review focused on different types of interventions on a patient level and provider level that are proven to be effective towards decreasing racial/ethnic health disparities in type 2 diabetes care.

## Literature Review

### **Diabetes Overview**

Diabetes is a lifelong disorder characterized by high glucose (sugar) levels in the blood caused by the pancreas producing little or no insulin. Insulin is a hormone that transports glucose into the body's cells. Glucose is the end product after the consumption of food and is used by the body as a source of energy. The major types of diabetes can therefore be differentiated by the amount of insulin available to carry glucose to the body's cells (National Diabetes Information Clearinghouse [NDIC], 2008).

#### *Type 1 Diabetes Mellitus*

Type 1 diabetes mellitus is an autoimmune disease in which the body's white blood cells of the immune system destroy the beta cells in the pancreas. The beta cells produce the insulin (Type 1 diabetes, 2011). Therefore, it is estimated that after 5-10 years of the onset of type 1 diabetes mellitus, individuals can no longer produce insulin. Consequently, the lack of insulin inhibits glucose transportation to the body's cells, resulting in an excess amount of glucose in the

blood. In type 1 diabetes, glucose is consumed but is then forced to be eliminated through the urine, because it cannot be transported to the cells. Children and young adults are most commonly affected by type 1 diabetes. It is been estimated that approximately 5 to 10 percent of those diagnosed with diabetes in the United States, have type 1 diabetes (NDIC, 2008). This unpreventable type of diabetes can be triggered by autoimmune, genetic, or environmental factors (CDC, 2010).

### *Type 2 Diabetes Mellitus*

Type 2 diabetes mellitus is more prevalent than type 1 diabetes, accounting for 90 to 95 percent of those with diabetes in the United States. Type 2 diabetes is an adult disease, however, the prevalence among young children and adolescents is increasing (NDIC, 2008). In 2010, the CDC reported diabetes (type 1 or type 2) in approximately 215,000 people younger than 20 years old (CDC, 2011). In 1999, type 2 diabetes accounted for 8-45 percent of new cases of pediatric diabetes in urban neighborhoods, in comparison to 16 percent in 1994 (Kaufman, 2002).

In type 2 diabetes, there is an abnormal interaction in which the fat, liver, and muscle cells of the body do not respond to insulin. Therefore, glucose is inhibited from entering the cells, resulting in an increase of glucose in the blood. The inappropriate response of the body's cells to insulin is referred to as insulin resistance (Type 2 diabetes, 2011). Over time insulin resistance can lead to a decreased production of insulin, leading to the same outcomes as type 1 diabetes (NDIC, 2008).

Certain environmental and familial elements are important risk factors for developing type 2 diabetes. Individuals over the age of 45, high cholesterol or high blood pressure, and women with a history of gestational diabetes are at risk for developing type 2 diabetes. Obesity, a family history of diabetes, and poor diet are major risk factors for acquiring type 2 diabetes

mellitus (Type 2 diabetes, 2011.). The National Diabetes Information Clearinghouse (2008) estimates that nearly 80 percent of those diagnosed with type 2 diabetes are overweight. In addition, the American Diabetes Association reports that African Americans, Asian Americans, Latinos, Native Americans, Native Hawaiians, and other Pacific Islanders are more commonly diagnosed with type 2 diabetes (ADA, 2010).

### *Gestational Diabetes*

Gestational diabetes is marked by high blood glucose levels, first diagnosed during pregnancy. In the United States 3 to 8 percent of pregnant women develop gestational diabetes (Lucile Packard Children's Hospital at Stanford, 2011). Within 5 to 10 years after delivery, there is a 40 to 60 percent chance that these women will develop type 2 diabetes (NDIC, 2008).

The placenta provides nutrition for the fetus but it also produces hormones that enhance a blocking effect on insulin. The larger the placenta the more hormones are produced, resulting in high levels of glucose in the blood. The excess amount of glucose in the mother's blood can cause the baby to release more insulin, which can lead to increased fat percentage in the baby (Lucile Packard Children's Hospital at Stanford, 2011). Therefore, gestational diabetes is more likely to develop in mothers with babies that weighed more than 9 pounds at birth (University of California San Francisco [UCSF], 2011).

Gestational diabetes can lead to birth complications such as stillbirth or birth defects (Lucile Packard Children's Hospital at Stanford, 2011). Macrosomia, the medical term for large baby, can precipitate complications during delivery. Injury or trauma to the baby's shoulders can occur during delivery due to excess body weight. Gestational diabetes leads to a greater insulin production by the infant's pancreas which can lead to low blood glucose at birth. Hypoglycemia

can precipitate breathing difficulty. In addition, excess insulin at birth increases the risk for obesity and type 2 diabetes later in life (ADA, 2011).

### **Racial/Ethnic Disparities in Diabetes**

Type 2 diabetes mellitus disproportionately impacts minority groups including African Americans, Hispanics/Latinos, Pacific Islanders, Asian Americans, and American Indians. The incidence of new cases for type 2 diabetes mellitus is higher for Asian/Pacific Islander, American Indian, African American, and Hispanic youth and adults when compared to non-Hispanic white youth and adults. The risk of being diagnosed with type 2 diabetes is 18% higher in Asian Americans, 66% higher in Hispanics, and 77% higher in non-Hispanic blacks in comparison to non-Hispanic white adults (CDC, 2011).

### *Disparities in Diabetes Quality of Care*

Health care disparity is defined as “differences in the overall rate of disease incidence, prevalence, morbidity, mortality, or survival rates in a given subpopulation as compared to the health status of the general population” (White, Beech, & Miller, 2009). Many factors contribute to the disparities in diabetes care including demographics, healthcare access, insurance coverage, education, and patient-provider interaction. Clinical literature attest that even with factors such as socioeconomic demographics controlled, healthcare disparities in diabetes care still exist (White, Beech, & Miller, 2009).

A two year study conducted at Harvard Vanguard Medical Associates (HVMA) analyzed the role of individual physicians and racial disparities in diabetes care and concluded that individual physicians impact the continuation of racial disparities. This study included 90 out of 128 primary care physicians who practiced in 13 of the 14 HVMA health care centers. These physicians managed at least 5 white and 5 black diabetic patients over 18 years old. There were

6,814 patients, 4,556 were white and 2,258 were black. Approximately, there were 44.5 Caucasian patients per physician and 15.5 African American patients per physician. This study found that both races equally received annual testing for hemoglobin A1C and LDL cholesterol. However, black patients were less likely to achieve ideal control of hemoglobin A1C, LDL cholesterol, and blood pressure. Overall, white patients in comparison to black patients significantly achieved control of hemoglobin A1C (47% white patients vs. 39% black patients), LDL cholesterol (57% white patients vs. 45% black patients), and blood pressure (30% white patients vs. 24% black patients;  $P < .001$  for all comparisons). Ideal control included having a hemoglobin A1C below 7 percent, LDL cholesterol below 100 mg/dL, and blood pressure below 130/80 mm Hg (Sequist et al., 2008).

Sequist et al. (2008) analyzed the above data to determine if the racial differences were due to between-physician effect or within-physician effect. Between-physician effect was defined as “proportion of racial disparities attributable to a disproportionate number of black patients compared with white patients receiving care from physicians who achieve overall lower control rates for DM outcomes” (p.1147). Within-physician effects was defined as “the proportion of racial disparities in diabetes mellitus care attributable to black patients achieving lower control rates than white patients within the same physician’s patient panel” (p.1147). Researchers found that sociodemographic measures (patients’ age, sex, race, insurance type, income based on zip code) contributed 13 percent to 38 percent of racial differences among hemoglobin A1C, LDL cholesterol, and blood pressure. However, within-physician effects contributed 66 percent to 75 percent of racial differences. African Americans obtained less adequate outcomes in comparison to Caucasian patients, in which both were managed under the

same physician. Therefore, the patient-physician interaction and sociodemographic characteristics attributes to racial differences in diabetes outcomes (Sequist et al., 2008).

### *Disparities in Diabetes Complications and Outcomes*

The complications of diabetes are serious and potentially life-threatening. Major complications of diabetes are renal disease, retinopathy, amputation, and cardiovascular disease (NDIC, 2011). Among adults, diabetes contributes as the primary cause of new cases of kidney failure, blindness, and non-traumatic lower-extremity amputations (CDC, 2011). Type 2 diabetes is the largest contributor of kidney failure in the United States (NDIC, 2011). In addition, diabetes increases the risk for stroke and heart disease (CDC, 2011).

Racial/ethnic minority groups experience greater complications and have worse outcomes (NDIC, 2011). Ethnic minorities disproportionately experience a higher occurrence of major complications including retinopathy, lower extremity amputations, and kidney failure. (Lanting et al., 2005). In addition, mortality rates associated with diabetes are higher among minority population groups than whites (Agency for Healthcare Research and Quality [AHRQ], 2001).

Retinopathy is a serious complication of diabetes that can lead to blindness. According to the National Eye Institute (NEI), approximately 40 to 45 percent of diabetics are affected by diabetic retinopathy (NEI, n.d.). African Americans and Hispanics have a higher risk of retinopathy (Lanting et al., 2005). Multiple studies have reported that African Americans with diabetes are less likely to be screened for diabetic retinopathy than whites (Oladele & Barnett, 2006). An observational study of 2002 examined if racial disparities existed in the quality of care within Medicare managed care, showed that African Americans with diabetes are less likely to receive eye examinations screenings than whites. Eye examination rates were 43.6% for blacks

and 50.4% for whites. Therefore, blacks are at a higher risk for developing retinal disease and blindness (Schneider, Zaslavsky, & Epstein, 2002).

According to the CDC, approximately 60% to 70% of individuals with diabetes have some form of nervous system damage, resulting in diminished sensation or pain. Severe forms of nerve damage results in lower extremity amputations. African Americans, Hispanics, and people living in neighborhoods with median incomes of less than 45,000 experience a consistently higher number of lower extremity amputations (CDC, 2011).

According to the American Diabetes Association (2011), diabetes is the leading cause of kidney failure in the United States. In addition, African Americans are 2.6 times more likely to develop End Stage Renal Disease (ESRD) than Caucasians (White, Beech, & Miller, 2009).

Research Question: What are the results of interventions to reduce racial/ethnic disparities in type 2 diabetes mellitus.

Definitions:

**Diabetes Mellitus:** a lifelong disorder characterized by high glucose (sugar) levels in the blood caused by the pancreas producing little or no insulin.

**Blood glucose:** the main sugar found in the blood and the body's main source of energy.

**Glycemic control:** controlling blood sugar.

**Hemoglobin A1C:** the test shows the amount of glucose that sticks to the red blood cell, which is proportional to the amount of glucose in the blood.

**Health care disparity:** differences in the overall rate of disease incidence, prevalence, morbidity, mortality, or survival rates in a given subpopulation as compared to the health status of the general population.

**Health Literacy:** the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand, and use information in ways which promote and maintain good health

**Diabetes Self-Management Education (DSME):** is the ongoing process of facilitating the knowledge, skill, and ability necessary for diabetes self-care.

**Racial/ethnic minority:** minority groups including African Americans, Hispanics/Latinos, Pacific Islanders, Asian Americans, and American Indians.

**Culture:** the knowledge, beliefs, customs, and habits a group of people share.

**Cultural Competence:** a set of congruent behaviors, attitudes, and policies that come together in a system, agency, or among professionals that enables effective work in cross-cultural situations.

**Methodology:** The search engines primarily used for this review were Pubmed, MedlinePlus, and Google Scholar search. The main search terms used were type 2 diabetes, disparities, “racial and ethnic disparities in diabetes”, minorities, diabetes self-management education, African Americans, Latinos, Asian Americans, Pacific Islanders and American Indians, health literacy, provider-patient communication, and cultural competency. The inclusion criteria consisted of articles that focused on improving diabetes care for racial/ethnic minorities living with type 2 diabetes mellitus in the U.S. Studies involving diabetes prevention or children under 18 years old were excluded. Any article requiring purchase, written in any other language besides English, or written before 1990 was excluded. The starting date 1990 was chosen to provide current information in reference to the research question.

## **Chapter 2**

### **Review of Literature**

This chapter examines research literature that pertains to the results of effective patient level interventions to reduce racial/ethnic disparities in type 2 diabetes. The patient level interventions include health literacy interventions, culturally tailored diabetes self-management education, community health workers, and web-based interventions.

#### **Health Literacy**

One of the most challenging barriers of effective communication between providers and patients is due to poor health literacy. The World Health Organization (2011) defines health literacy as, “ the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand, and use information in ways which promote and maintain good health” (p.1). Poor health literacy is more prevalent in racial and ethnic minorities, older adults, immigrants, and patients with lower educational attainment (Wilson, 2003; Paasche-Orlow et al., 2005). There is a strong correlation between inadequate literacy skills and less knowledge of disease. Research has shown that patients with poor health literacy demonstrate difficulties comprehending blood sugar values, dosing schedules, reading medication labels, educational pamphlets, and informed consent documentation (Schillinger et al., 2002).

A recent 2011 study reported that 50 percent of diabetic patients with poor functional health literacy were familiar with hypoglycemic symptoms in comparison to 94 percent of diabetic patients with adequate functional health literacy. Only 38 percent of those with poor literacy knew how to properly treat the symptoms compared to the 73 percent of patients with

adequate literacy. Thus, poor health literacy can lead to information poverty (Williams et al., 1998). Information poverty has been defined as, “that situation in which individuals and communities, within a given context, do not have the requisite skills, abilities or material means to obtain efficient access to information, interpret it and apply it appropriately. It is further characterized by a lack of essential information and a poorly developed information infrastructure” (Britz, 2004). To gain efficient diabetes self-management skills, individuals must develop the ability to interpret and apply information appropriately (AADE, n.d.). Information poverty contributes to ongoing ignorance among a population (Williams et al., 1998).

A health literacy and diabetes study in 2002 reported that for type 2 diabetic patients with access to primary care physicians in public hospital clinics, inadequate health literacy was independently associated with poorer glycemic control. In addition, poor health literacy is associated with higher occurrence of diabetes complications, especially retinopathy (Schillinger et al., 2002).

Recent research studies emphasize the importance of health literacy education in improving diabetes self-management. The Wallace et al. (2009) study from 2006-2007 including three internal medicine practices in California, Louisiana, and North Carolina, demonstrated promising data that literacy education and brief counseling improves diabetes self-management. The study included 250 patients aged 18 and older, with type 2 diabetes mellitus. African Americans represented 45 percent and Hispanics were 33 percent of the sample. Patient literacy was determined with a pre-test comprehension test called the Test of Functional Health Literacy for Adults (S-TOFHLA). Nearly half of the participants exhibited less than adequate literacy, including failure of high school completion. The literacy-appropriate educational materials included a *Living with Diabetes* guide developed by an interdisciplinary team of clinician

researchers. Patients and providers contributed to this guide. The educational guide addressed topics including diet, blood glucose monitoring, physical activity, medication adherence, insulin use, pictures, and motivational phrases. In addition, the guide was developed to be easily understandable among all literacy levels (Wallace et al., 2009).

Self-management was measured by the participants' activation, distress, self-efficacy, engagement in their care, and knowledge. All of these components were individually assessed through administered pre and post questionnaires. The participants' knowledge was measured by a nine question survey designed by the authors of this article (Wallace et. al., 2009). The survey included general and specific questions about diabetes. "Open-ended questions ranged from general knowledge about diabetes ("Diabetes can harm what parts of your body?") to specific actions to be taken in the event of hypoglycemia ("What are some steps to treat low blood sugar?")" (p.329). The self-efficacy was determined by an eight item measure which asked participants to rate their level of confidence in their capability in achieving self-care diabetes tasks, such as blood glucose monitoring. The Patient Activation Measure (PAM) (Hibbard et al., 2004) is a short version 13-item measure that was used to examine the participants' activation. PAM is a reliable and valid measure that assesses the knowledge, skill, and beliefs of individuals for self-management (Hibbard et al., 2004). A five item scale was used to assess the participants' ability to manage their self-care behaviors. Raw scores from each survey were converted to a 100 point scale. Higher scores suggested better achievement (Wallace et al., 2009).

Research assistants (RAs) reviewed the *Living with Diabetes* guide with the participants and advised them to pick an area of focus for improvement in their diabetes self-care. In addition, using a scale from 1 to 10, the participants were asked to rate their level of confidence in achieving their goal for improvement in their diabetes care. Participants were contacted

between 2 and 4 weeks of the initial visit for a follow up. The follow up allowed the RAs to follow the participants' progress and evaluate how they used the *Living with Diabetes* guide. Subsequently, participants' followed-up in office or by phone 12-16 weeks after contact with the RA. This last follow-up concluded the program and consisted of the 5 post-surveys (Wallace et al., 2009).

This study concluded that changes in participants' knowledge, self-efficacy, activation, and self-reported behaviors were statistically significant ( $P \leq 0.001$ ) in comparison to baseline. Therefore, providing literacy appropriate information with brief counseling in primary care settings could be an effective approach for improving diabetes self-management skills. Overall, this intervention was effective across all literacy levels in improving diabetes care short-term (Wallace et al., 2009).

In addition to interventions targeted at improving diabetes self-care skills through health literacy, literacy is essential for effective provider-patient communication. Effective provider-patient communication is important in delivering high quality health care. Improving the provider-patient communication and the self-management skills of patients are critical actions towards reducing ethnic/racial disparities in diabetes care (Diette & Rand, 2007).

### **Diabetes Self-Management Education (DSME) Programs**

Type 2 diabetes mellitus disproportionately impacts minority groups including African Americans, Hispanics/Latinos, Pacific Islanders, Asian Americans, and American Indians. The risk of being diagnosed with diabetes is 18% higher in Asian Americans, 66% higher in Hispanics, and 77% higher in non-Hispanic blacks in comparison to non-Hispanic white adults. The CDC has estimated that by 2050 that greater than 20 percent of the US population will represent people from different cultural backgrounds (CDC, 2011). Measures to reduce the

racial/ethnic disparities in diabetes care include community diabetes education programs targeting ethnic minorities.

Funnell et al. (2008) defined diabetes self-management education as “the ongoing process of facilitating the knowledge, skill, and ability necessary for diabetes self-care” (p. 597). It is estimated that 95% of daily diabetes management is handled by the individual with diabetes (Magee et al., 2011). Diabetes self-management education (DSME) programs provide a way to empower patients with the knowledge and skills needed to successfully manage diabetes (Mensing, Boucher, & Cypress, 2000). Glycemic control is defined as controlling blood sugar and is an important goal for diabetes care. Tight or good diabetes control is a key factor in successfully managing diabetes (American Diabetes Association [ADA], 2011). Research suggests self-management group and individual educational programs are effective in improving glycemic control (Rickheim et al., 2002).

The Centers for Disease Control and Prevention (CDC) Community guide Task Force, The American Diabetes Association, and systematic reviews all acknowledge DSME as an evidence-based practice (Norris, Engelgau, & Narayan, 2001). DSME combined with empowering patients to strengthen their self-management skills, contribute to reducing health care costs and better health outcomes (Wagner et al., 2001; Menzin et al., 2001). Ethnic minorities are less likely to participate and benefit from the standard, non-culturally tailored DSME. Therefore, research suggests implementing DSME that acclimatizes to the needs of underserved populations (Strine et al., 2004). There is strong evidence that multifaceted programs located in inner cities help improve access to efficient healthcare services and improve patients’ initiative to manage their diabetes (Vachon et al., 2007).

Culture is defined as, “the knowledge, beliefs, customs, and habits a group of people share” (Kulkarni, 2004). Each ethnic group is enriched with different food preferences, dietary habits, and way of life (Kulkarni, 2004). Integrating culturally based interventions have been proven to increase the acceptance and effectiveness of diabetes self-management education (Two Feathers et al., 2005). Relevant research demonstrates that diabetes self-management education programs, especially community culturally based are key approaches in reducing ethnic and racial disparities in diabetes care. Interventions that involve culturally sensitive framework based on a culture group’s behavioral patterns and way of life is essential for optimal diabetes outcome (Anderson & Christison-Lagay, 2008).

#### *DSME for African Americans and Latinos*

Culturally appropriate interventions have been proven to be effective in improving health outcomes in ethnic minority groups. A study in 2002 conducted in Detroit, Michigan examined a diabetes community based program and concluded that a culturally tailored lifestyle intervention significantly improves diabetes management and reduces diabetes complications. The community based program is called Racial and Ethnic Approaches to Community Health (REACH). The REACH program is the CDC’s agenda to eliminate racial and ethnic disparities within diabetes and 6 other health areas. The REACH program in this study included 2 hospitals with specialty clinics and one community based health center in Detroit, Michigan. The participants included 151 African Americans and Latino adults who agreed by consent to participate, out of 300 people who were eligible to participate. All 151 participants completed the baseline survey, however, only 111 (74%) participants completed the post-intervention survey. Therefore the data results reflected 74 percent of the total participants. Participants were 18 years or older, with the mean age of 59 years old. African Americans represented 64 percent and

Latinos 36 percent of the participants. Sixty-nine percent of the participants were considered obese, with having diabetes for an average of 12 years and a mean baseline A1C of 8.4 percent. Nearly half of the participants had received less than high school education. However, 50 percent of the participants had previous diabetes education classes (Two Feathers et. al, 2005).

The program encompassed intervention materials for African Americans, Latinos, and trained community residents. The curriculum targeted dietary, physical activity, and diabetes self-care instruction. There were five 2 hour group sessions every four weeks, from June to October 2002. Although 41% of participants attended all 5 intervention group sessions, 98% percent of the participants attended at least one session. Seventy-four percent of the participants completed both the pre-intervention and post-intervention surveys. Analysis from completed pre-intervention and post-intervention surveys suggested that REACH Detroit intervention had statistically significant improvements in dietary knowledge, physical activity knowledge, health behavior, and in hemoglobin A1C level (Two Feathers et. al, 2005).

Researchers found that participants developed a better awareness of the link between healthy eating and blood sugar control, in comparison to baseline ( $P=.013$ ). Physical activity knowledge in understanding the relationship between exercise and better blood sugar control, improved significantly ( $P=.035$ ). Overall, females and participants aged 18-59 years demonstrated a higher improvement in knowledge in comparison to the other REACH participants. Many positive changes were seen among participants in lifestyle health behavior. Statistically significant improvements among all participants included a reduction in consumption of regular soda or fruit-flavored beverages and monitoring blood sugar according to their physician's recommendations ( $P<.0001$ ). In addition, vegetable consumption ( $P=.001$ ) and whole grain bread consumption ( $P=.004$ ) increased significantly. The duration of participants

adhering to a healthy eating plan also increased significantly ( $P=.004$ ). Among all REACH Detroit subgroups, women, African Americans, and participants aged 18-9 years exhibited the highest improvement. These diabetes self-management behaviors in the long term can substantially reduce diabetes complications, morbidity, and health related costs (Two Feathers et al, 2005).

#### *DSME for African Americans*

African Americans adults are twice as likely to be diagnosed with diabetes, are more likely to suffer from diabetes complications, and twice as likely to die from diabetes as non-Hispanic whites (Office of Minority Health [OMH], 2010). Many interventional approaches have failed in this ethnic group due to the lack of incorporating cultural relevance to reflect cultural beliefs, customs, language, and food patterns (Kittler & Sucher, 1990; Brown & Hanis, 1999). However, research initiatives including culturally appropriate education have been established to reduce the burden of diabetes in the African American communities. Project DIRECT (Diabetes Interventions Reaching and Educating Communities Together) was the first comprehensive community diabetes project in the United States for African Americans. Engelgau et al. (1998) describe Project DIRECT as consisting of the following 3 components:

Health promotion (improving diet and physical activity levels), outreach (improving diabetes awareness, detection of undiagnosed diabetes, and ensuring that persons with diabetes who are not receiving continuing diabetes care are integrated into the health care system), and diabetes care (improving self-care, increasing access, and improving the quality of diabetes preventive care received within the health-care system. (p. 605).

The Centers for Disease Control and Prevention developed this program in response to the major problem of diabetes in African American communities. Project DIRECT was designed as a template intervention to raise awareness and provide information on disease burden, risk factors, and effective survey methods and interventions (Engelgau et al., 1998).

*DSME for African American Women*

It has been estimated that approximately 50 percent of African American women born in 2000 or beyond will develop type 2 diabetes mellitus in their lifetime (Black Women's Health Imperative, n.d.). According to the U.S. Department of Health and Human Services Office on Women's Health (2010), 1 in 4 African American women over 55 years old have diabetes. African American women have the highest rates of being overweight or obese compared to other groups in the U.S. (OMH, 2011). Therefore, their risk of developing type 2 diabetes and complications are high. African American women are more likely to develop microvascular complications, than African American men and non-Hispanic whites (U.S Department of Health and Human Services on Women's Health, 2010). According to Keyserling et al. (2000):

There is considerable evidence, however, that available behavioral treatment programs may be less effective for African American women compared with whites. This discrepancy may be due to an inadequate sociocultural match between intervention models and the needs of African American women with diabetes. (p.797).

Therefore, researchers have developed programs to reduce diabetes disparities among African American women.

A randomized one year study in 2002 constructed a community based diabetes management program to demonstrate improvement of diabetes outcomes in African American women, when using culturally tailored interventions. The study consisted of 200 African American women all over 40 years old with type 2 diabetes. Of the 200 African American women participants, the average length of being diagnosed with diabetes was 10 years with the mean age of 59 years old. Approximately one third of the participants self-reported annual income of less than \$10,000 per year. Researchers recruited the participants from 7 practices in central North Carolina and randomly divided them into 3 groups. The three treatment conditions group were: clinic and community (group A), clinic only (group B), or minimal intervention (group C). The community (group A) group included 3 group sessions and 12 monthly phone calls from a peer counselor. The peer counselor's role was to reinforce behavior change goals through social support. The clinic groups A and B included four monthly visits with a nutritionist who provided physical activity and dietary intake counseling. The minimal group (group C) only consisted of educational pamphlets, which were mailed to the participants randomly assigned to the group (Keyserling et al., 2002).

Researchers used the New Leaf Choices for Healthy Living with Diabetes program. This program consists of a community intervention with 12 monthly phone calls from peer counselors. 4 clinic based health counselor visits, and three group educational sessions (Keyserling et al., 2000). The New Leaf program involves three components including dietary modifications, increasing physical activity, and improving diabetes self-management skills. Dietary modifications consisted of lowering total and saturated fat consumption and achieving tighter control of carbohydrates intake. Physical activity incorporated 30 minutes of day of moderate intensity physical engagement. Diabetes self-management skills included medication

use, home glucose monitoring, foot care, and other aspects of diabetes maintenance. Participants were instructed to complete four clinic visits with a health counselor and attend three 90 minute group sessions. Group sessions included education, active learning, group discussion, and taste testing of modified food recipes. The sessions were designed to empower these women to overcome unhealthy eating habits and the lack of physical activity. Peer counselors were assigned to contact participants each month for 12 months. Peer counselors were community diabetes advisors who had type 2 diabetes mellitus for at least 3 years and exemplified basic knowledge of diabetes and positive role model skills. Researchers obtained a baseline nonfasting blood sample for blood glucose and cholesterol analysis. Baseline dietary habits were obtained using the Minnesota Nutrition Data System (Keyserling et al., 2002).

Follow-up findings suggested that the New Leaf program was practical in improving self-care behaviors for diet and exercise among African American women. The participants were all significantly overweight and considered physically inactive at baseline. To measure improvements in physical activity (PA) researchers used a Caltrac accelerometer for assessment of 175 (88%) participants at 6 months and 167 (84%) participants at 12 months. Participants wore an accelerometer for seven days while awake to assess physical activity levels during the 12 month study period. Researchers analyzed physical activity outcomes between groups at 6 and 12 months, according to the accelerometers. Keyserling et al. (2002) found that when “comparing group A with C, the difference approached statistical significance at 6 months ( $P = 0.095$ ) and was significant at 12 months ( $P = 0.019$ ). Comparing group B with C, the difference was statistically significant at 6 months ( $P = 0.036$ )” (p. 1580). Participants from all three groups reported a lower intake of saturated fat and cholesterol; however, there was a

considerable under reporting of dietary intake. Overall, the participants found the intervention to be helpful and culturally relevant (Keyserling et al., 2002).

#### *DSME for Rural African Americans in the South*

African Americans living in rural communities face greater challenges due to the shortage of health care professionals (Balamurugan et. al., 2009). More importantly, southern African Americans have great difficulty self-managing their dietary habits (Anderson-Loftin & Moneyham, 2000). Culturally based diabetes education is essential for southern African Americans living in rural communities.

Several studies have been performed to analyze different interventions targeting the improvement of diabetes self-management for high risk African Americans living with type 2 diabetes mellitus. One study examined if dietary self-management education for underserved African American southern rural populations would improve physiological diabetes outcomes and self-management skills. This 2002 longitudinal quasi-experimental study identified high risk African Americans as those with at least one diabetes complication that could be changed by diet modifications. Diabetes complications includes having a hemoglobin A1C higher than 8%, cholesterol greater than 200 mg/dL, triglycerides greater than 200 mg/dL, low density lipoprotein cholesterol greater than 100 mg/dL, body mass index (BMI) greater than 25 kg/m<sup>2</sup>, or a summary score on the Food Habits Questionnaire (FHQ) of greater than 2.5. (Anderson-Loftin et al., 2002).

This study took place in a small rural county in South Carolina. South Carolina ranks as second in diabetes incidence in the United States. However, the diabetes prevalence and mortality rate was higher in this county, than the state and the nation. In South Carolina, blacks have a 50 percent higher occurrence of type 2 diabetes than whites. African Americans

represented 58% of the total population (<25,000) in the small rural county. Researchers included in the study 23 high risk African American adults with diabetes from a family practice office within the county. Approximately 83% of participants were obese and hyperglycemic with elevated blood pressures, hemoglobin A1C values, and total cholesterol levels. This 5 month dietary self-management educational intervention included four low-fat dietary education classes administered by a local dietitian. In addition, the intervention consisted of peer/professional discussions groups and follow-up visits. The discussion groups and follow-up visits were managed and provided by a nurse case manager. To promote early intervention for acute illness and complications, the nurse case manager reported any significant outcomes to a connected physician (Anderson-Loftin et al., 2002).

Researchers concluded that the 5 month intervention resulted in a significant reduction in hemoglobin A1C, fasting blood glucose values, and fat-related dietary habits. The hemoglobin A1C values decreased by a mean of 1.18 percentage points (SD=1.5). The dietary habits were measured from the Food Habits Questionnaire using a 2-tailed Wilcoxin signed rank test. The statistical analysis showed a decrease in acute care visits to the emergency department, doctor's office, or health clinic. Consequently, there was a significant reduction in healthcare costs at 5 months post intervention. Overall, the dietary self-management education for underserved African American rural populations improved physiological outcomes and self-management skills (Anderson-Loftin et al., 2002).

A more recent pilot study also investigated a culturally based intervention for rural African Americans. This 2008 study compared diabetes self-management education administered in a group or individual setting to determine which approach rural African Americans would best respond to. The study was conducted during 2005-2006 over a 6 month time frame in a small

rural county of Central Virginia. Participants were randomly assigned to either the Group DSME or Individual DSME. The culturally based 8 week DSME included storytelling, figurative language relevant to African Americans, simple colorful culturally tailored educational handouts, comprehensive topics in diabetes. Researchers measured hemoglobin A1C, personal goal achievement, and empowerment levels at baseline and 10 weeks after the baseline (Utz et al., 2008). Hemoglobin A1C is the average amount of glucose in the blood for an average of 2 to the 3 months. Therefore, it is a measurement of glycemic control (Kids Health, 2011). Researchers concluded no significant difference between the Group DSME and Individual DSME. However, both groups demonstrated a slight improvement in glycemic control, goal attainment, and self-management skills over a 3-month period (Utz et al., 2008).

#### *DSME for Hispanics/Latinos*

The risk of being diagnosed with type 2 diabetes is 66% higher in Hispanics (CDC, 2011). It is estimated that the incidence of diabetes among Hispanics will increase by 149% between 2000 and 2050 (Metghalchi et al., 2008). Latinos experience an earlier onset of diabetes in comparison to other populations and diabetes is considered the sixth leading cause of death among Latinos. Latinos are “twice as likely to have serious complications, including heart and kidney disease, high blood pressure, and amputation” (Matthews et al., 2009). Hispanics/Latinos in the United States have demonstrated higher levels of non-adherence to diabetes self-care practices than non-Hispanic whites (Kirk et al., 2007).

Culturally tailored diabetes self-management education programs have been established and proven to be effective for significantly improving glycemic control among the Hispanic population in the United States. Liebman, Heffernan, & Sarvela (2007) 3 year study examined the effects of implementing culturally tailored DSME program with an established chronic care

model for low-income Latinos. This study was taken place at a Holyoke Health Center (HHC) in Massachusetts from February 2003 to October 2006. The HHC provides medical and dental services mostly to low income families, with more than 90% of patients speaking Spanish. This study included 580 patients out of 1188 that were included in the community center's registry who were diagnosed with diabetes. Greater than 86% were Latino, two-thirds were obese, and majority of the participants had public health insurance (Liebman, Heffernan, & Sarvela, 2007).

Intervention measures included bilingual language including Spanish and English education, fitness, and self-management classes. The involvement of community health workers and community mentors contributed towards providing a culturally sound chronic disease self-management classes, assisting participants to medical visits, and providing support through telephone and home visits. To encourage participants to remain active in their self-care, private meetings with a nurse and nutritionist were included. In addition, community activities such as breakfast and snack clubs were developed to strengthen healthy food preparation skills. Community activity efforts including the breakfast and snack clubs were managed by successful participants who functioned as community mentors (Liebman, Heffernan, & Sarvela, 2007).

The study found an improvement in glycemic control and an association between participation in self-management activities and better glycemic control. Data analysis demonstrated that the participants who were more involved in the activities included in the intervention, demonstrated a significant reduction in hemoglobin A1C level. Almost half of the community center's diabetic patients obtained an HbA1c below 7 percent (Liebman, Heffernan, & Sarvela, 2007). Additional studies have demonstrated that culturally designed type 2 diabetes education programs are effective approaches to improving glycemic control in the Hispanic population (Metghalchi et al., 2008).

The Metghalchi et al. (2008) prospective cohort study investigated the impact of a comprehensive diabetes education program on blood glucose control on Hispanics with type 2 diabetes. The study recruited 23 Hispanic males and females with type 2 diabetes, ranging from 37 to 69 years old. Recruitment occurred through flyer placements at Hispanic markets and in ambulatory care clinics (Metghalchi et al., 2008).

The three month study included diabetes education classes taught in Spanish at a local university once a week. The education providers consisted of Hispanic registered dietitians, registered nurses, physicians, and nutrition students. Transportation was provided for those in need and family members were encouraged to attend classes. In addition, the subjects were provided with a free glucose monitor and a glucose written log for daily blood sugar checks. Monthly follow-ups were required (Metghalchi et al., 2008).

Data analysis occurred at baseline and 3 months included the concentrations of the following: glucose, insulin, hemoglobin A1C, total cholesterol, triglycerides, low-density lipoprotein (LDL) and high-density lipoprotein (HDL). Researchers found significant reductions in fasting blood glucose (23.20 mg/dL,  $P < .001$ ), hemoglobin A1C (0.82%,  $P < .001$ ), HDL (-4.20 mg/dL,  $P < .001$ ), and cholesterol/HDL ratio (0.48%,  $P < .001$ ) after 3 months of education compared with baseline. Thus, culturally sensitive comprehensive diabetes education improves glycemic control in a short period of time. The study demonstrated the importance of designing culturally sensitive diabetes education for at risk diabetes populations, in particular racial/ethnic minorities (Metghalchi et al., 2008).

*DSME for Asian Americans*

The increasing immigration of Koreans has contributed to the increasing health problem of type 2 diabetes mellitus in Asian American communities. The risk of being diagnosed with diabetes is 18% higher in Asian Americans in comparison to non-Hispanic white adults (CDC, 2011). The Kim et al. (2009) study examined the efficacy of a community based education program in achieving better diabetes self-management among Korean American immigrants.

This study compared Korean American immigrants who received the self-help intervention program for type 2 diabetes management (SHIP-DM) intervention to the Korean American immigrants in the control group. The SHIP-DM was defined by Kim et al. (2009) as “a structured, culturally tailored behavioral intervention program that focuses on empowering patients with greater knowledge, self-efficacy, and self-help skills concerning diabetes” (p.2). The SHIP-DM consists of 3 components, including a weekly education class for 6 weeks, teletransmission home glucose monitoring, and monthly telephone counseling. The home glucose monitoring with teletransmission included providing the participants with a glucometer, an electronic blood pressure monitor, and a teletransmission system. The teletransmission system consisted of a system in which glucose and blood pressure measurements are transmitted through a phone to a contracted Web site. The Web site allowed the bilingual nurse counselors to view the transmitted glucose and blood pressure readings. Therefore, the participants’ recorded data allowed nurses to better facilitate monthly counseling. In addition, trained bilingual nurses and a nutritionist provided the 2-hour weekly education classes, in which diabetes knowledge and self-management skills were advocated. After the 6 week class the home glucose monitoring was given for 24 weeks and monthly reports were provided to the participants. In addition, the

bilingual nurses also conducted 10-25 minutes monthly telephone counseling to the participants for 24 weeks during the glucose monitoring phase (Kim et al., 2009).

A computer automated program randomly assigned the 83 participants to either the SHIP-DM group (n = 41) or the controlled group (n=42). Seventy-nine of the participants completed the study. Participants included in the study were Korean American immigrants aged 30 years or older with uncontrolled diabetes identified by having a hemoglobin A1C level of 7.5% or greater within the past 6 months. In addition, all participants were residents of the Baltimore-Washington area (Kim et al., 2009).

This study utilized the Diabetes Knowledge Test (Fitzgerald et al., 1998), the Summary of Diabetes Self-Care Activities (SDSCA) (Toobert, Hampson, & Glasgow, 2000), self-efficacy for diabetes scale (Lorig et al., 2001), the Kim Depression Scale for Korean Americans (KDSKA) (Kim, 2002), and the Diabetes Quality of Life Measure (DQOL) (Jacobson et al., 1988). In addition, a research laboratory with trained researchers was used to assess diabetes knowledge, self-care, and physiologic outcomes due to the culturally tailored intervention. Differences among the physiologic outcomes were measured at 18 and 30 weeks and compared to baseline values using a general linear model, with the statistical significance at 0.05. The researchers concluded that this intervention significantly improved the participants' diabetes knowledge, self-care management, self-efficacy, attitudes toward diabetes, depression, and quality of life in comparison to the control group. Therefore the participants gained a greater satisfaction in self-management skills (Kim et al., 2009).

Participants achieved tighter control of their glucose, with a 1.19% reduction at 18 weeks and a 1.31% reduction at 30 weeks compared to baseline. Although the reduction in A1C levels was not significant, this study highlighted how clinical interventions helped to sustain glucose

control. At 30 weeks the participant's total cholesterol and triglyceride levels were significantly lower than the control group. In addition, this study constituted a very high retention rate despite common beliefs that ethnic minority groups are challenging to recruit into clinical trials. The study demonstrated that culturally sensitive diabetes programs are beneficial in improving self-management skills and glycemic control. These findings are likely to result in less diabetes complications, benefiting the patient and the healthcare system in the long-term (Kim et al., 2009).

#### *DSME with Community Health Workers*

There is a shortage of health professionals among African Americans, Hispanics/Latinos, and American Indians/Alaska Natives (AI/ANs). According to Warne (2006), "Although African Americans, Hispanics/Latinos, and AI/ANs together represent more than one fourth of the U.S. population, they comprise less than 9% of nurses, 6% of physicians, and 5% of dentists" (p.4). The CDC (2010) estimates that by 2050 more than half of the U.S. population will be non-white. The lack of minorities becoming healthcare providers will significantly contribute to the healthcare disparities of quality and availability of clinical services for minorities (Warne, 2006). To address the needs of ethnic minority groups experiencing disparate diabetes outcomes, programs have been developed that incorporate community health workers (CHWs) into culturally tailored diabetes education. The American Association of Diabetes Educators (AADE) has acknowledged the importance in community health workers in diabetes care (AADE, 2009).

Frequently, community health workers (CHWs) are also residents of the areas they work in. Community health workers enhance the dynamics of culture and language of underserved communities, therefore serving as an instrumental link between ethnic minority communities and

the healthcare system. Community health workers contribute towards providing culturally appropriate health education for ethnic minority groups (CDC-CMWs, 2011).

Several studies have shown that community health workers improve glycemic control and self-management behaviors among minority ethnic groups, especially within the Hispanic/Latino population. Between May 2006 and March 2007, researchers from the University of Illinois at Chicago (UIC) constructed a pilot study to determine if a culturally tailored DSME administered by community health workers in community environments would sufficiently improve glycemic control and self-management skills in Hispanics/Latinos with type 2 diabetes. Researchers used a non-experimental pre-test-post-test single group design to measure short-term changes in diabetes markers. CHWs received a 20-hour workshop training prior to being certified to teach within their community. At the beginning of this pilot study the CHWs had achieved one year of instructing diabetes sessions (Castillo et al., 2010).

The study participants included seventy enrolled Hispanic/Latino residents, 24 to 84 years old, who were residents of Southeast Chicago or surrounding communities. However, only 47 of the enrolled participants completed the pre-test and post-test data. In addition, the participants had an average of 11.8 years of being diagnosed with diabetes and an average years of schooling was 6.8 years. This study consisted of 2 CHWs who instructed participants for 10 weeks utilizing a linguistic and culturally appropriate diabetes education framework. Each educational session was two-hours each week, with additional options for make-up sessions. On average, approximately 10-15 participants including friends and family were included per group class. Class meeting sites were left up to the discretion of each group class (Castillo et al., 2010).

Measurements of data were performed at baseline and at completion of the 10 weeks education. Diabetes knowledge, self-care behaviors, depression, and psychosocial self-efficacy

were all measured. The Diabetes Knowledge Questionnaire (DKQ-24) (Garcia, Villagomez, & Brown, 2001) from the Starr County Diabetes Education Study was implemented to assess diabetes knowledge. The Summary of Diabetes Self-Care Activities (SDSCA) (Toobert, Hampson, & Glasgow, 2000), a short questionnaire concerning diet, exercise, foot care, smoking, and blood glucose testing was administered to evaluate self-management skills. The well-known Patient Health Questionnaire (PHQ-9) Quick Depression Assessment scale examined depression (Kroenke & Spitzer, 2002). To measure self-efficacy researchers distributed the Diabetes Empowerment Scale-Short Form (DES-SF) (Anderson et al., 2003). Clinical outcomes that were measured included height, weight, A1C, self-monitored blood glucose, and blood pressure. In addition, 2 post-intervention focus groups were formed to collect qualitative data (Castillo et al., 2010).

Researchers reported that after 10 weeks of culturally tailored DSME from CHWs, there were significant decreases in the participants' hemoglobin A1C ( $P=.001$ ) and systolic blood pressure ( $P=.006$ ). Diabetes knowledge, physical activity, spacing carbohydrates, healthy meal planning, healthy eating, and depressive symptoms all had improved among the participants. Researchers suggested that CHWs were instrumental to the recruitment of community members considering the participants were mostly made aware of this program through announcements through churches, organizations, and community venues. Researchers found that participants mostly found difficulty in adhering to a diet appropriate for diabetes management. Focus group members reported improved knowledge with managing food portions and habits after the 10 week sessions. Researchers concluded that DSME directed by CHWs in ethnic minority communities for Latinos, improved glycemic control and self-management skills (Castillo et al., 2010).

The Deitrick et al. (2010) study examined the perspectives of promotoras (health care workers) and patients of implementing a promotora into diabetes self-management education for Latinos. According to Deitrick et al. (2010), a promotora de salud is defined as “a lay health worker or CHW who educates, motivates, and supports the members of her community in their pursuit of health” (p.386). Promotora in Spanish means a female promoter. A 2010 pilot study included 6 focus groups consisting of 35 out of the 73 Latino patients who had completed the promotora-led program and agreed to share their experience. There were 14 men and 21 women, ages ranging from 40 to 82 years old. The promotora program that the Latino patients completed consisted of 2-hour class sessions that included diabetes education, diet, physical activity, glucose meter use, medications, exams and testing, avoiding diabetes complications, and preserving health. Researchers constructed a study design in which members of each of the focus groups and the promotora would complete questions to assess their perspectives of DSME with promotoras. Deitrick et al. (2010) developed these nine questions in Spanish for the focus group participants:

- (a) “Did you like the diabetes education classes you recently completed? Why or why not?”
- (b) “Did it make a difference that the class was taught in Spanish? Why or why not?”
- (c) “What part of the class helped you the most? Why?”
- (d) “Was there a part of the class that you would change? What and why?”
- (e) “Has your ability to manage your diabetes changed as a result of taking the class? In what way?”

- (f) “Have you made lifestyle changes since taking the class? Why or why not? If you have, what are some examples of the changes?”
- (g) “Would you recommend the class to a friend or family member? Why or why not?”
- (h) “In your opinion, what do you think is the best way to learn about diabetes in our community?” and
- (i) “Would you be willing to attend a follow-up class or phone call to help support (reinforce) self-management goals/ If yes, what would be most convenient for you? If no, why not?”

Deitrick et al. (2010) developed these seven questions which were administered to the promotora by a doctoral-level medical anthropologist:

- (a) “What is your definition of a promotora?”
- (b) “How would you describe your role and your work to clients?”
- (c) “How is your role different from that of a community health work? From a lay health work?”
- (d) “Have you changed the diabetes education classes since you began teaching? How and why?”
- (e) “Do you think this role is effective in diabetes care for Latinos? Why or why not?”
- (f) “Do you think that being a Latina diabetic has an impact on your work as a promotora? How?”
- (g) “Please comment on anything else you think is important to know about your work with Latino patients that might be important to know for our article.”

The promotora answered these written questions and also completed a face-to-face interview with the anthropologist. Deitrick et al. (2010) reported that the promotora stated in the interview,

When a promotora is based in the health care system and takes on a project to inform the community a chronic disease [diabetes], she should be able to relate the educational topics from “the heart” and have a first-hand knowledge about the disease. She needs to establish a personal connection as she taps in to her audience. (p. 391).

The responses to the questions listed above were entered into a computer database for coding and analysis. Grounded theory was utilized as well as open-coding to enhance understanding of any patterns or interactions found in the data. In addition, researchers examined the responses individually to identify the similarities and differences among phrases, ideas, themes, etc. Based on the responses in the database, researchers found that the respondents of the six focus groups were quite uniform of the perspectives of DSME that included a promotora. Respondents documented how effective the diabetes education was in teaching them how to make diet modifications within the scope of their cultural foods. Respondents reported that the classes provided a greater understanding of the importance of doctor visits, exams, and testing. Importantly, respondents experienced attitude changes in their perceptions of building positive active relationships with their health care provider and the health care team. The focus group noted their gratification of diabetes education classes taught in Spanish. Respondents collectively had a positive response to the promotora’s personal experience with diabetes (Deitrick et al., 2010). Overall, the respondents’ feedback adds to the significance of culturally tailored DSME in minority populations towards improving diabetes management.

In addition, the interviewed promotora reported positive feedback of the DSME and the importance of supportive relationships to the success of the program. Overall, implementing a promotora into DSME lessen the diabetes fears of Latinos, encouraged confidence, and empowered them to better manage their diabetes (Deitrick et al., 2010)

#### *DSME through Web Interventions*

Culturally based community diabetes education programs have integrated community health workers, health coaches, and healthcare team members as approaches to reduce disparities among ethnic and racial minorities. Diabetes self-management education provided in the classroom has been proven to be effective in reducing diabetes complications and improving glycemic control (Rickheim et al., 2002). With the demanding schedules of Americans, finding time to commit to classroom education can be difficult. As the World Wide Web becomes more accessible and the popular means of communication in the 21<sup>st</sup> century, educators have established programs to further help reduce the impact of diabetes (Fallows, 2005).

Telemedicine has been successfully used as an approach for providing diabetes education (Balamurugan et al., 2009). There is convincing evidence that internet-based diabetes self-management programs are advancing effective approaches for improving health outcomes and healthy behaviors (McMahon et al., 2005). Considering that more than two thirds of the U.S. population use the internet, internet based diabetes education programs can serve as an important intervention to facilitate information and support, especially among ethnic minorities who are disproportionately affected by diabetes (Fallows, 2005). Additional effective interventions have been developed and integrated into DSME programs to provide clinical services for people with diabetes (McMahon et al., 2005).

The Jernigan and Lorig (2011) study investigated a community based internet diabetes self-management workshop for American Indians and Alaska Natives. Approximately 69 percent of American Indians and Alaska Natives utilize the internet (Heuertz et al., 2002). American Indians and Alaska Natives are disproportionately affected by type 2 diabetes mellitus. This study that was published in the *Health Promotion Practice*, examined if an internet delivered disease self-management workshop would be possible within the American Indians and Alaska Natives population. Researchers concluded that the diabetes self-management workshop was possible to establish among American Indians and Alaska Natives and could be a future intervention for delivering diabetes education in the clinic setting. Furthermore, successful measures were achieved in recruiting American Indians and Alaska Natives. Therefore, researchers suggested that the listservers approach may be effective in recruiting other minority populations (Jernigan & Lorig, 2011).

Researchers used the Stanford Internet Diabetes Self-Management workshop (IDSMW) to analyze recruitment of American Indians and Alaska Natives, their usage, accessibility, acceptability, the cultural appropriateness of the workshop, and diabetes outcomes. The participants included American Indians and Alaska Natives in one group (n=27) and non-American Indians/Alaska Natives into another group (n=27). Among the American Indians and Alaska Natives were 18 different tribes (Jernigan & Lorig, 2011).

Recruitment occurred through the internet, in which researchers used a listserver of nearly 150 people. The listserver included eight American Indians and Alaska Natives organizations in urban and reservation settings. Organizations included health clinics, social service agencies, non-profit health agencies, a listserver of e-newsletters, and Yahoo diabetes user groups (Jernigan & Lorig, 2011).

The IDSMW is a 6 –week workshop that includes comprehensive diabetes education including the scope of diabetes, meal planning, label reading, exercise, preventing diabetes complications, medications, coping with emotional stress, and how to enhance communication with clinicians. The workshop also included weekly postings of targeted goals on the action planning bulletin board and weekly discussions among the participants. The Stanford IDSMW 6-week workshop only offered between 20 to 25 individuals during a 6-week period. Given the lower literacy levels among ethnic minorities, this program was designed to be comprehensible for anyone with at least a seventh grade reading level (Jernigan & Lorig, 2011).

The participants were asked to log in to the workshop at least three times a week for 2 hours. Participants were required to report their tracking of glucose level, fitness, and action planning. Researchers analyzed participants' logins, their completion of assignments, and which sections of the workshop was used. (Jernigan & Lorig, 2011)

This internet program was culturally based involving the experience of other American Indians and Alaska Natives and illustrating the workshop in a culturally sound context. Having an all American Indian and Alaska Native group, resulted in the workshop being culturally acceptable among the participants in that group. This group of participants favored open dialogue with others from similar backgrounds who could better understand the challenges of meeting diabetes self-management goals. The researchers highlighted that the participants in the American Indians and Alaska Natives valued the social support of others who shared the same culture and experience of living with diabetes. This intervention was very successful with recruiting participants for the study and for peer leaders to assist with future online workshops. Upon completion of the workshop researchers reported that participants found the workshop very beneficial and convenient considering the lack of time spent with their providers concerning their

chronic disease. Overall, this group the American Indians and Alaska Natives found the workshop to be culturally appropriate (Jernigan & Lorig, 2011).

The Carter, Nunlee-Bland, & Callender (2011) study investigated if urban African Americans with type 2 diabetes who had access to online diabetes self-management education would achieve better patient outcomes in reference to hemoglobin A1C, blood pressure, and body mass index (BMI) in comparison to African Americans without internet access. African Americans have the highest prevalence of diabetes among all racial/ethnic groups in the U.S., therefore this ethnic group was chosen for the study. The 9 month study included participants who were recruited from a primary care practice in Washington, D.C. Participants included African American men and women, average age of 56 years old, with 66 percent earning between 25,000 to 50,000 dollars per year. All participants were required to have at least an eighth grade literacy and basic reading skills to adequately use the online program. In addition, a nurse and the participants' healthcare provider were included in the study to provide lab results, assist in changing health plans, and to provide support (Carter, Nunlee-Bland, & Callender, 2011).

Initially 74 patients were recruited; however, due to attrition only 47 patients participated in the study. The two groups included the randomly assigned treatment group (n = 26) and the control group (n = 21). Members of the treatment group were provided with a laptop with a wireless scale, a blood pressure cuff, and a glucometer to measure weight, blood pressure, and glucose. Instructions were provided at the participants' home, which included how to use the different devices to automatically transmit the recorded information to the online program. Participants were required to perform weekly blood pressure and weigh themselves. In addition, blood glucose was to be checked three times a day (Carter, Nunlee-Bland, & Callender, 2011).

The online program consisted of three modules including self-management, health education, and social networking modules. The self-management module included the patients' health record and action plan based on the treatment plan provided by the patient's healthcare provider, evidenced based literature, and the patients' individual needs and preferences. This module allowed the participants' healthcare providers to view their information and transmit updated treatment plans, laboratory results and other directives to the nurse and patient. In addition, patients participated in biweekly 30-minute video conferences with a nurse in which they would discuss the patient's online progress, lab results, and behavior change strategies. The health module included culturally appropriate health education videos, links to health education Web sites, and materials on nutrition, physical activity, stress management, weight loss, and health and wellness in general. The social networking module provided the treatment group opportunities to discuss and share information (Carter, Nunlee-Bland, & Callender, 2011).

Data results were retrieved from the following: baseline and post-study surveys; transmitted information into the online program; feedback from a random sample of half ( $n = 13$ ) of the treatment group. At baseline, the average hemoglobin A1C for participants was 8.9 percent, the average blood pressure was 147/88, and the average BMI was 35.8. After completion of the 9 month study, researchers reported a significant association between participation in the online program and achieving a hemoglobin A1C of 7 percent or below and a healthy BMI between 18.5 and 24.9 ( $p < .05$ ). Overall, participants were 4.58 times more likely to achieve the hemoglobin A1C target of 7 percent or lower if they were enrolled in the online program. In addition, there were no significant differences in the following baseline measures: hemoglobin A1C, BMI, and blood pressure, diabetes knowledge, or self-reported self-management behavior and practices, such as healthy eating and participating in physical activity

( $p < .001$ ). The knowledge of diabetes improved and adherence to diabetes self-care practices such as regular foot checks ( $p < .05$ ). The participants in the treatment group reported that the intervention increased their motivation to better manage their diabetes. The treatment group reported better discipline practices with maintaining regular visits with their healthcare providers and regularly checking their blood glucose levels (Carter, Nunlee-Bland, & Callender, 2011).

Furthermore, Meigs et al. (2003) developed a web-based support tool called Disease Management Application (DMA) to improve evidence-based management of type 2 diabetes. Researchers found significant reductions in A1C and LDL cholesterol levels in the intervention group. Therefore, the investigators concluded from the controlled trial, that web-based interventions have a potential to improve evidence-based management of diabetes care (Meigs et al., 2003). Many primary care systems have started to incorporate Web-based diabetes education programs into their practice. Programs such as the MerckEngage Health Partnership Program allow patients to self-management their diabetes from online, provides patients with a free health coaches who follows the patient's progress and maintains contact, and allows healthcare providers to monitor their patient's self-management progress (MerckSource, 2008). However, randomized trial studies are still investigating the long-term effects of web interventions and web-based diabetes support programs that implement electronic medical record access and online care plans (Ralston et al., 2009).

## Chapter 3

### **Review of Literature**

This chapter examines research literature that pertains to the results of effective provider level interventions to reduce racial/ethnic disparities in type 2 diabetes. The provider level interventions include provider-patient communication and cultural competency.

#### **Provider-Patient Communication**

Many factors contribute to the incidence and advancement of diabetes including genetic, lifestyle, social, medical, and cultural factors. Therefore, healthcare providers are faced with multiple variables, which can influence challenges in managing minority patients with diabetes (Caballero, 2007b). Health care disparities are defined as “differences in the overall rate of disease incidence, prevalence, morbidity, mortality, or survival rates in a given subpopulation as compared to the health status of the general population” (White, Beech, & Miller, 2009). Lack of effective provider-patient communication, concerning chronic disease processes and treatment plans, can lead to poor health outcomes. Minorities are disproportionately affected by diabetes and the literature shows that ethnic minorities are less likely receive supportive direction from their practicing clinicians (White, Beech, & Miller, 2009). Simple interventions that are known but less commonly used in practice are proven to help close the loop and strengthen the communication between physicians and diabetic patients with low health literacy. One simple strategy found useful to physicians was assessing recall or comprehension of new concepts among patients, especially those with low health literacy. On average, about 50 percent of patients cannot recall and comprehend information conveyed by their physician (Schillinger et al., 2003). Managing chronic diseases such as diabetes mellitus incorporates understanding the condition, monitoring disease progression, maintaining visits with multiple clinicians, and

understanding treatment therapy and insurance coverage (Glasgow et al., 2003). Therefore, clinicians gain insight of their patients' needs and are more likely to develop appropriate interventions tailored to the patient need. Researchers also suggest that clinicians should avoid medical jargon and technical terms, to facilitate the message more clearly and quicker to patients (Osborn, Cavanaugh, & Kripalani, 2010).

Clinicians are advised to avoid presenting commonly used words in unfamiliar ways and to always gain a confirmation of the patient's comprehension and understanding. Utilizing the teach-back method significantly increases patients retention of health information conveyed. The teach-back method is a tool used to assess patients' comprehension by asking the patient to explain or demonstrate information that has been conveyed to them. Developing and using culturally sensitive plain language, writing out acronyms and new terms, and asking open-ended questions can enhance the provider- patient communication with low-literate patient. Clinicians can support their low-literacy patients by providing community resources such as diabetes education classes, nutrition classes, and health education materials (Osborn, Cavanaugh, & Kripalani, 2010).

### **Cultural Competency and Future Recommendations**

According to the Office of Minority Health (OMH), cultural competence is "a set of congruent behaviors, attitudes, and policies that come together in a system, agency, or among professionals that enables effective work in cross-cultural situations" (OMH, 2005). The CDC has estimated that by 2050 that greater than 20 percent of the US population will represent people from different cultural backgrounds (CDC, 2011). To this date no randomized controlled studies have been done to evaluate the impact of cultural competency among providers in the management of diabetes (Caballero, 2007a). Clinicians are significant contributors to

encouraging patients to improve their self-management skills and maintain effective diabetes self-care, which can lead to better health outcomes (Piette et al., 2003). Healthcare providers' biases, prejudices, and uncertainties when treating minorities can contribute to healthcare disparities (Burgess, Fu, & Van Ryn, 2004). Consequently, state governments have implemented requirements that physicians obtain annual continuing medical education credits concerning cultural aspects in healthcare (Caballero, 2007a).

A randomized controlled trial of 2009 constructed and investigated the effects of an internet-based course on cultural competence in the context of type 2 diabetes. Researchers developed a self-assessment tool called the Cultural Competence Assessment Tool (CCAT) and included 122 family medicine residents from a national sample. The CCAT scores of the family medicine residents in the experimental group significantly increased after the completion of the internet course. Consequently, the total CCAT score for the control group residents resulted in no change. Based on the findings, the investigators concluded that an internet based course on cultural competency is an effective educational approach. (Kutob, Senf, & Harris, 2009). Clinicians including physicians, nurse practitioners, and physician assistants agree that cultural competency training programs are effective strategies to improve health care for minority patients (Weber et al., 2007). However, more evidence-based research is needed to determine the effectiveness of cultural competency in reducing ethnic disparities in diabetes care and improving healthcare outcomes. In addition, future research is necessary concerning the best approaches to facilitating, evaluating, and administering cultural competence training for healthcare providers (Kutob, Senf, & Harris, 2009).

## Discussion

The literature presented demonstrates the ability to effectively implement and sustain diabetes self-management interventions to improve diabetes care among ethnic/racial minorities. Successful management of diabetes is greatly determined by efficient lifestyle modifications (Two Feathers et. al, 2005). Community involvement strengthens personal relationships with patients, builds trust, and promotes the importance of sustaining optimal self-management skills (Deitrick et al., 2010). The data suggest that self-management intervention strategies designed culturally tailored with an interdisciplinary approach, improve glycemic control. In addition, community mentors contribute a major impact to influencing racial/ethnic minorities with type 2 diabetes to have better control of their diabetes (Castillo et al., 2010). Many primary care systems have incorporated such programs into their practice through referrals to neighborhood DSME programs.

As the U.S. transitions to an internet dominant communication society, online DSME programs may serve as an effective means of better self-management for racial/ethnic minorities living with type 2 diabetes (Meigs et al., 2003; Balamurugan et al., 2009). Programs such as, the MerckEngage Health Partnership Program allow patients to self-management their diabetes from online and provides patients with a free health coaches who follows the patient's progress and maintains contact. Therefore, such programs aid patients in following their provider's recommendations through meal planning, exercise, and resource information. In addition, with such programs, physicians can follow their patients' progress and assist with follow-up visits (MerckSource, 2008).

Overall, the expansion of educational opportunities through diabetes self-management education programs has reduced health disparities among diabetic ethnic minority populations (CDC-Diabetes, 2011).

Cultural competency is a tool that can contribute to reducing and eliminating health disparities in people with diabetes. Provider awareness of patients' health and nutritional beliefs and practices and essential relevant factors can better equip clinicians to better access and treat minority populations (Weber et al., 2007).

Given the evidence based findings regarding the importance of DSME programs and the type of effective programs, ethnic minority groups are benefiting from effective culturally tailored DSME (Two Feathers, et al., 2005; Anderson & Christison-Lagay, 2008). Additional research should focus on the long-term effects of Web-based interventions and provider cultural competency in diabetes care (Ralston et al., 2009; Caballero, 2007a) Research efforts should include more studies including racial/ethnic minorities other than African Americans and Hispanics. Further research should be performed for validating, improving, and maintaining long-term effects of interventions designed to reduce racial/ethnic disparities in type 2 diabetes (Metghalchi et al., 2008).

## **Conclusion**

Significant efforts have been made toward addressing the ethnic/racial disparities in diabetes. The review identified several strategies to reduce diabetes disparities among racial/ethnic minorities, including health literacy interventions, culturally tailored DSME programs, CHWs, Web-based interventions, and provider-patient communication approaches. The findings confirmed the clinical impact of such programs by ultimately the analysis of glycemic control. However, efforts are still needed to optimize diabetes self-management and long-term outcomes of minority populations living with diabetes in the United States. Increasing effective research efforts for racial/ethnic minorities with type 2 diabetes, will expand the integration of interventions into the clinical team in primary care settings to improve the quality of diabetes care for minorities

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### **Abstract**

**Objective:** This review examined the results of current interventions to reduce racial/ethnic disparities in type 2 diabetes mellitus.

**Method:** The search engines primarily used for this review were Pubmed, MedlinePlus, and Google Scholar search. The main search terms used were type 2 diabetes, disparities, minorities, diabetes self-management education, health literacy, and provider-patient communication.

**Results:** The review identified several strategies as successful interventions to reduce diabetes disparities among racial/ethnic minorities. These interventions included health literacy education, culturally tailored diabetes self-management education, and provider-patient communication approaches. The review found that interventions that utilized cultural influence as a strategy to reduce disparities increased patient knowledge, improved self-care skills, and improved glycemic control.

**Conclusion:** Significant efforts have been made toward addressing the racial/ethnic disparities in diabetes. However, efforts are still needed to optimize diabetes self-management and long-term outcomes of minority populations living with diabetes in the United States.