The Psychological Stress of Patients' with Type II Diabetes Mellitus in Nigeria

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Abstract: Nigeria, like many other African countries, has seen the emergence of chronic diseases such as stroke, cardiovascular diseases, and diabetes. In particular, the rapid increase in diabetes mellitus type 2 has become a national concern. The effect of social cognitive function associated with the stress from diabetes is also a serious concern within the adult populations (i.e., between the ages of 25-79 years). The knowledge gained from this study would enhance diabetes management and reduce complications. The purpose of this study was to examine the relationship between diabetes distress and the independent variables of knowledge, culture, religion, and spirituality in the northern and southern regions of Nigeria. Bandura's (2004) social cognitive theory was the bases for this study. The northern and southern regions of the country were chosen due to recognized differences in these variables. A combination of the Diabetes Knowledge Questionnaire; Diabetes Distress Scale; and HIV/AIDS Knowledge, Attitude, and Beliefs Patient Questionnaire was used. The scores was analyzed using a t test, Pearson product-moment correlation, multiple regression, and a 1-way MANOVA. Diabetes distress was found to be higher for patients with more knowledge about diabetes ($\beta = 0.28$, $p < 0.001$) and with higher cultural belief scores ($\beta = 0.32$, $p < .001$). This study illustrated the relationships and trends between diabetes distress and other variables in these 2 regions of Nigeria. Equipped with this knowledge, other researchers may now consider the influence of knowledge and culture when developing trial-design and quality-improvement strategies that could contribute to a better quality of life and positive social change.

Introduction to the Study

Diabetes is a chronic disease that afflicts people on a global scale. Chronic diseases presumably have a slow progression and long-lasting effects on individual sufferers (American Diabetes Association [ADA], 2011b; International Diabetes Federation [IDF], 2011; World Health Organization [WHO], 2011b). The psychological stress associated with chronic diseases may also be prolonged (Fisher et al., 2009). Diabetes distress is a psychological stress associated with diabetes (Fisher et al., 2009). As people are living longer, the percentage of the population living with diabetes worldwide has steadily increased (American Diabetes Association [ADA], 2011b; International Diabetes Federation [IDF], 2011; World Health Organization [WHO], 2011b). Along with this increase, psychological stress associated with diabetes such as diabetes distress would presumably increase as well. The burden to individuals and society based on the increased healthcare costs and decreased productivity may constitute a hardship to global south (developing country) such as Nigeria.

Besides the hardship, the WHO (2010) suggested that the deaths of patients with primary or secondary diagnosis of diabetes might be up to 80%. Diabetes if properly managed along with its psychological stress may increase adherence to treatment, healthy diet, and routine exercise plans that could improve quality of life (QoL) and reduce mortality.

This study was focused on the correlates of diabetes distress with other variables such as knowledge, culture, religion, and spirituality in Nigerian adults. The objective of the study was to determine if diabetes distress is related to the above-mentioned variables, which may reflect the behaviors of the northern or the southern regions of Nigeria. Diabetes is a serious problem to global south that is presently experiencing a high rate of infectious and communicable diseases including Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS). Chronic disease epidemiologists predicted that the impact of diabetes to the global

south would be comparable to that of HIV/AIDS in 16 years. (Idemyor, 2010). The ADA

(2011a) suggested 25.6 million adults 20 years and older, male and female, worldwide, were

diagnosed with diabetes in 2011, and 10.9 million adults 65 years and older were in the United

States. This represented 11.3% and 26.9% of the population, respectively (ADA, 2011a). This

chapter included the population and general health of Nigeria, disease burden, problem

statement, the study purpose, research questions and hypotheses, theoretical and conceptual

framework, the nature of the study, and the significance of the study among many others.

Diabetes is a chronic disease that has a long-lasting effect on the sufferers. Even though

genetics linkage and environmental factors could be involved in its susceptibility, it is widely

presumed that psychological stress is the major contributor to an effective management of the

disease (Forth & Jude, 2011; Fisher, 2009). To understand the extent of psychological stress

association with diabetes knowledge, culture, religion, and spiritual in northern and southern

Nigeria, is to understand the diabetes distress among these populations.

Types of Diabetes

There are several types of diabetes including diabetes mellitus type I (DMT1), diabetes

mellitus type II (DMT2), gestational diabetes, as well as those triggered by conditions such as

genetic predispositions, infections, surgery, and medications (National Diabetes Information

Clearinghouse, 2011). These conditional activations include gene onset because of surgery and

medications and/or infections, and other illnesses could contribute to the disease.
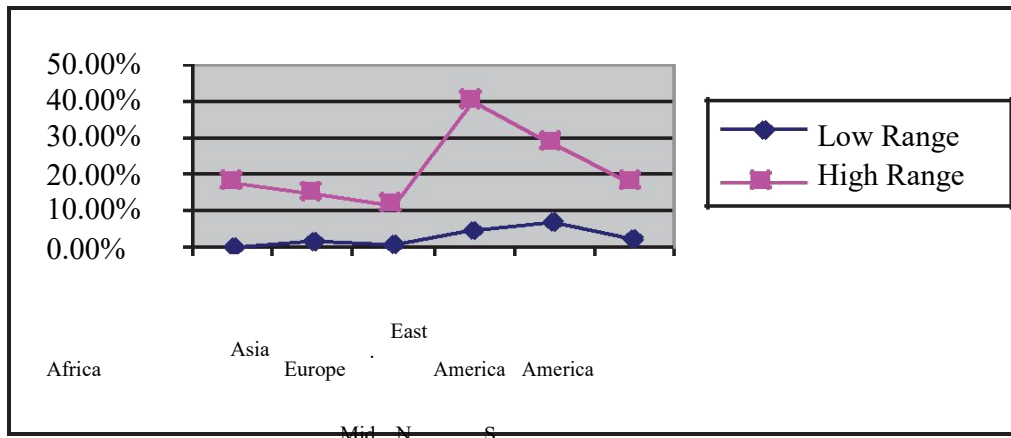
Rates of Diabetes

Chronic diseases such as diabetes and hypertension are increasing at an alarming rate in

Nigeria, as a direct result of overweight and obesity (Hossain, Kawar, & El Nahas, 2007). This

increase is associated with cardiovascular disease that results in 18 million deaths annually on a

global basis for which diabetes is a major predisposing factor. Diabetes' long-lasting effects may

mask the negative impact it has had on health due to years spent coping with psychological stress, complications, and debilitating effect on QoL and mortality. DMT2 has increasingly become a behavior/lifestyle-associated disease in both developed countries and global south, as the number of people with diabetes increases. An example of the recent increase in diabetes' prevalence, was the changed rates observed in the United States. From 1976–1980 the U.S. rate was 8.9%, whereas from 1988 to 1994 it increased to 12.3% among adults 40 to 74 years of age (Martorell, 2005).

Data obtained from the 2004–2006 National Health Interview Survey, the Centers for Disease Control and Prevention (CDC; 2011c), and the WHO (2003, 2010) suggested that DMT2 afflicts 90–95% of diabetes sufferers in the United States, and 90% worldwide. As the disease prevalence is increasing worldwide, particularly in low- and middle-income countries such as Nigeria, perhaps, the distress is also increasing. Diabetes is a chronic disease and the seventh leading cause of premature death in the United States (ADA, 2011a; CDC, 2011c) According to Adeghate, Schattner, and Dunn (2006), in 2006, West African countriessuch as Nigeria reported a 2.8% prevalence of DMT2 when compared to other African countriessuch as Mauritania (2.61%), Sierra Leone (2.4%), and Gambia (0.3), and these numbers willincrease in the coming years.

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Figure 1: Global occurrence of diabetes

The source of this figure is Adeghate, E., Schattner, P., & Dunn, E. (2006). An update on the etiology and epidemiology of diabetes mellitus. *Annals of the New York Academy of Sciences, 1084*, 1–29.

Figure 1 is a representation of rates of diabetes globally. In this figure, Africa, including Nigeria, had a low diabetes occurrence of 0.3% and a high of 17.9% of the entire population whereas North America, including the United States, had a low of 6.69% and a high of 28.2% (Adeghate et al., 2006). The Middle East had the highest occurrence at 40% (Adeghate et al., 2006). DMT2 and the associated psychological stress is a global problem (Adeghate et al., 2006) that is in need of investigation. I focused on the distress of DMT2, a comparative analysis of patients in Northern and Southern regions of Nigeria.

Causes of Diabetes

The multifaceted involvement in endocrine disorders could affect the metabolic processes of food substances such as carbohydrates, protein, and fat. The cause of diabetes mellitus is not yet understood. However, the pancreas inability to produce sufficient insulin for glucose metabolism is associated with the cause (Adeghate et al., 2006). The ineffectiveness of the insulin produced to metabolize food is also a barrier. These metabolic disorders at the cellular level may lead to structural changes in the tissues of many organs, including those in the vascular system (Adeghate et al., 2006). The major contributors to this endocrine disorder include the

following:

1. Environmental factors such as physical inactivity, obesity, viral infection, drugs,and toxic agents. Excessive calories may lead to overweight/obesity therebyincreasing the risk of diabetes.

2. The genetic susceptibility that determines predisposition may contribute todiabetes.According to National Institutes of Health (2010) report, there are up to 100,000 genes in the 23 human chromosomes that could influence the rate ofbody energy/calorie consumption and appetite for food.

Consequences of Diabetes

Globally, diabetes disease has both individual and national consequences. According to Bloomgarden (2004), the consequences of diabetes on a personal level include the risk of homocysteine and cardiovascular diseases, inflammation found in nonalcoholic fatty-liver disease. Other consequences include lipid increase such as high-density lipoprotein (HDL), decreases in low-density lipoprotein (LDL), and an increased risk of malignancies (Bloomgarden, 2004). The global rise in diabetes and associated psychological stress is as much an economic burden as it is a health burden on individual and the society. Beyond the health burden, the epidemic of diabetes has a great economic impact due to the costs of medical treatment and management of the disease. For example, in countries such as India, the treatment costs could range from 15 to 25% of household income (Yach, Stuckler, &Browndell, 2006). An individual in Tanzania, a global south country with a low wage or income, could pay as much as 25% of his or her wages on treatment of this disease (Yach et al., 2006). This accentuates the burden of the disease on those who could least afford the cost. As more and more people are diagnosed with this disease, the economic burden to individuals and society alike would continually increase. A major challenge is sorting out the contributing factors, accessing the psychological problems associated with the disease, designing and implementing measures for

the control and management of the disease and distress to avoid individual, countrywide, and global adverse consequences (Adeghate et al., 2006).

The complex nature of diabetes self-management may require knowledge of the disease, management skills, and psychological behavioral change, which could overwhelm newly diagnosed patients. Therefore, diabetes self-management including stress management and psychological distress that evolved from worries, fear, negative emotions and cognitions may affect patients' QoL, management, and outcome.

Ninety-seven articles from 1993 to 2008 reviewed by Cobden et al. (2010), that focused on the relationship between self-management and various other determinants including biological, psychological, economic, and behavioral suggested a strong correlation. In addition, the correlation between patients' psychological stress and understanding of care, medicationadherence, treatment satisfaction, change in behavior, and economic factors, may improve. Addressing psychological issues associated with this disease was necessary to reduce cost and burden.

According to Cobden et al. (2010), the costs associated with diabetes had increased in rural,urban, global south, and developed nations. In the last 10 years, the costs association rose to395% in the United States, had double in India between the years 1998 to 2005, and may exceed$550 billion by 2015 in China (Cobden et. al., 2010). This phenomenon is not limited to thesecountries; it is a worldwide occurrence. Patients in low-income countries such as Nigeria where72% of the cost for diabetes prescription drugs are paid by patients could hardly afford the drugs.The Sub-Saharan African countries where patients' income could hardly afford syringes that costof $0.20 to $0.60 in Mali, $0.04 to $0.20 in Mozambique, and $.01-$1.50 in Zambia were amajor concern (Azevedo, and Alla, 2008).

In these patients' the tendency of ensuring a good quality self-management may be lacking due management costs and could result in inadequate glycemic control. Gregg, Callaghan, Hayes, and Glenn-Lawson (2007), suggested that proper glycemic control could reduce diabetes-related complications to about 37% and may in turn ease the burden of diabetes distress. Gregg et al. also suggested that only 36% patient population attained the recommended level of HbA1c. They noted that 1-day of traditional education in diabetes session improved self-management of the disease. Even though the distress may still affect patients' psychology, education on psychological acceptance may be a meaningful way to improve and provide adifferent approach.
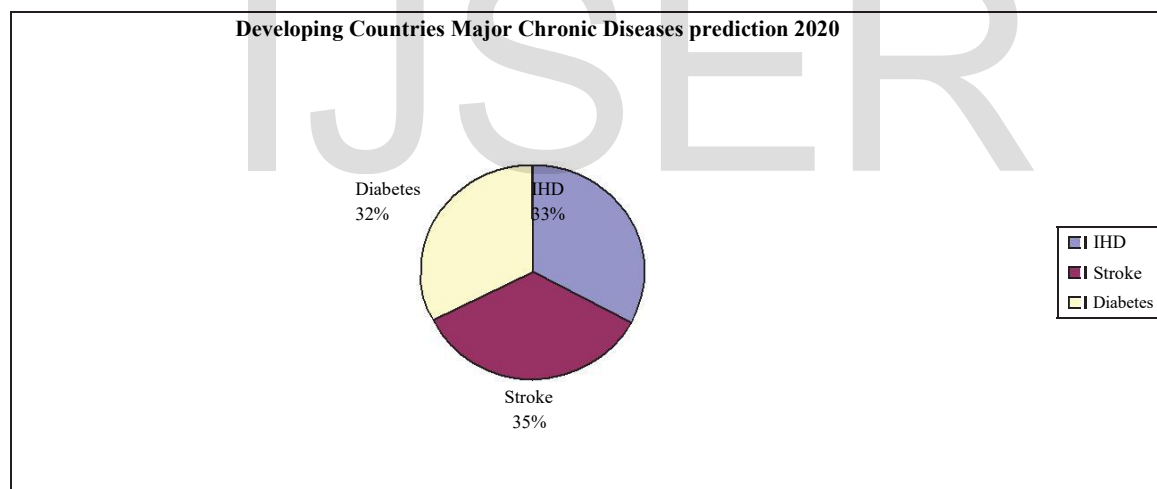
Disease Burden,

The disease cost to the individual and society cannot be underestimated. Wang et al. (2009) indicated that the disease global direct cost for individuals between the ages of 20 and 79 years could be in excess of $241 billion. This amount does not include stress related costs. The cost of treating diabetes physically and psychologically was a widespread concern in both global south and developed countries (Wang et al., 2009). Diabetes psychological distress due to lack of knowledge, cultural, spirituality, and religious hindrance, may contribute to direct and indirect costs in the treatment. According to ADA (2012), individuals diagnosed with diabetes could experience added burden because of psychological stress. This stress could alter blood glucose levels in diagnosed individuals. These individuals were likely not to cater for themselves, may indulge in alcohol abuse, partake in less exercise, eat unhealthy meal, or even practice improper glycemic control. In addition, stress hormone may directly alter blood sugar level that could increase the burden to individual and society directly or indirectly.

In the United States alone, the annual direct and indirect costs of diabetes disease in 1997 was $98 billion (ADA, 2011a &Idemyor, 2010). This cost rose to $174 billion in 2007 and does

not include psychological stress. Outside United States, the cost and unhealthy lifestyles also

rose. For example, Sao Paulo a city in Brazil notably had 70 to 80% of their population

physically inactive or not involved in rigorous exercises that may reduce the susceptibility of

diabetes and perhaps distress (WHO, 2003). Lack of exercise may be associated with the

region's disease related stresses and deaths.

WHO (2003) predicted that by 2020, 75% of all deaths worldwide would be associated

with chronic diseases. In the global south, 71% of those deaths would be ischemic heart disease,

75% stroke, and 70% diabetes as shown in Figure 2 WHO (2003). These chronic diseases deaths

and costs could be reduced with proper disease and psychological stress management.

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Figure 2: The chronic disease prediction for the year 2020.

Adapted from *Diet, Nutrition, and the Prevention of Chronic Diseases*, by World Health Organization, 2003, retrieved from http://www.who.int/hpr/NPH/docs/who_fao_expert_report.pdf.

The psychological burden of this disease required further investigational studies. The

investigation should include the public health professionals in psychological practices if a

reduction in burdens/costs were expected. This study was essential because the burden associated

with the disease psychological stress, could significantly affect quality of life (QoL) and may result in patient functional disability that could drive up costs of management (Ludman et al., 2004).

Problem Statement

Nigeria had seen a gradual growth in the diabetic population and perhaps distressed patients from 1960. According to Azevedo and Alla (2008) and Olatunbosun, Ojo, Fineberg, and Bella (1998), Nigeria, after becoming an independent nation in 1960, still had a <1% prevalence of diabetes and perhaps associated stress. This increased to 2.4% in the mid-1980s and 2.8% toward the late 1990s. It is predicted that the prevalence would increase by 98% equivalent 23.9 million people in 2030 and with this increase; diabetes distress presumably would increase as well WHO (2010). According to WHO (2010), over 220 million people were diagnosed with diabetes in 2004 worldwide and deaths associated with the disease accounted for 80% of all mortality in low- and middle-income countries including Nigeria.

Diabetes distress increase is a growing problem for individuals and countries alike (Fisher et al., 2009). It had been suggested that genetic predispositions, environmental factors, and psychological stress are contributing factors. In addition, lifestyle behavior may also contribute to precursors such as overweight and obesity. According to Abubakari and Bhopal (2008), 25% to 57% of Nigerian adult population were physically inactive. The physical inactivity could be as a result of cultural norms, religious and spiritual beliefs, or lack of the diabetes disease knowledge. Overweight or obese person may have a psychological stress that could manifest adversely in individuals diagnosed with diabetes. Adult diabetes disease is a serious condition that poses great danger to public health in Nigerian community. This

includesthe rising costs of health care of the country. This cost, although a burden to developed

nationswould cripple developing nations such as Nigeria with a national budget of $132 billion

or less. The research problem addressed in this study elaborated the impact of diabetes distress

and how it could increase mortality and adversely affect disease outcome. To my knowledge,

there have been no studies that compare the psychological stress of diabetes in the northern and

southern regions of Nigeria, based on the specific differences in knowledge, culture, religion,

and spirituality. It is essential to understand the contributions of stress or the predictor variables

to diabetes management when there is a relative absence of other variables such as overweight

and obesity. This would enhance the management of distress in DMT2 in the Nigerian

community and would have considerable positive public health significance.

Purpose of the Study

The purpose of this study was to explore the relationship if any between diabetes distress

and knowledge, culture, religion and spirituality that could add to better QoL in adult men and

women (ages 25–79 years) who live in northern and southern regions of Nigeria. In this study, I

used the (HAKABPQ), (DKQ), (DDS), and demographic questionnaire from 2000 U.S. Census

to investigate the variables. I explored participants' psychological distress toward diabetes to

understand how knowledge, culture, spirituality, and religion, influence diabetes distress, in the

northern and southern regions of Nigeria. Due to patterns of habitation, these regions represented

differences in Muslim and Christian culture, religion, spirituality and even knowledge of the

disease itself. This assisted to determine the association between diabetes distress and other

variables in these regions.

The exploration of perceptions of healthcare providers including physicians was not a

factor in this study. However, when possible and appropriate, an exploration and investigation of

health-risk behaviors such as unhealthy lifestyles, unhealthy dietary intake, and physical

inactivity that could contribute to poor QoL were performed. These health-risk behaviors could

inversely lead to diabetes distress and burden via diabetes complications. If knowledge, culture, religious, and spiritual beliefs were positively associated with diabetes distress, then the extent of the association is important in the treatment of the ailment. This research will contribute to positive social change by not only educating citizens, but also guiding other researchers in the development of trial-design and quality-improvement strategies for future distress associated with diabetes in Nigerian communities.

Nature of the Study

I used a convenience sampling technique that provided information on participants' knowledge, culture, religion, spirituality, and distress toward diabetes. The quantitative design used and the research-method approach enabled comparison of the two geographical locations. The design, in the form of a cross-sectional study assisted in the determination of the relationship between DMT2 psychological stress and other variables that included knowledge, culture, religious, and spiritual beliefs.

The study tested the research hypotheses using data collected from the two teaching hospitals located in northern and southern regions of Nigeria. The data were used to determine the association between variables in these regions. The data were analysed using statistical multivariate logistic regression, Pearson correlation, t test, and MANOVA. The examination of the correlational relationship between the independent and dependent variables took place with the adjustments of possible confounders. The results of this statistical analysis were in the form of odds ratios with a CI of 95% and a p value of <0.05 that indicated a likelihood that the relationship had not occurred by chance alone.

**Theoretical and Conceptual Perspective**

The theoretical basis of this research study is Bandura's (2004) idea of health promotion

and disease prevention/management by social-cognitive means. This concept recognized psychosocial factors to be the determinant of how well a life is lived with good measure of self-efficacyor with disease/debility, complication, and burden. Self-efficacy is an important tool in improving QoL, fighting against occurrence, and the management of diabetes for two reasons. First, self-efficacy tends to influence behavior and in turn, outcome. Second, it can influence other determining factors such as knowledge, cultural, spirituality, and religious belief that are essential in managing diabetes distress.

Chronic diseases such as diabetes and associated psychological stress that require self-managementalso requires self-efficacy. Bandura (2004) suggested that biomedical approaches todiseases and illness should focus on acute diseases and not chronic diseases. Bandura suggestedthat chronic-disease management should focus on self-efficacy leading to positive psychologicalperspective or positive behavior that would lead to better QoL. In Bandura's report, a group ofpatients' studies involving self-efficacy and self-management had 47% participants with lessplaque blockage in their arteries, significant weight loss, a rise in good cholesterol, lowered badcholesterol, participation in more exercise, and other cardiovascular activities when compared tothose who were only on medication. Those treated with biomedical approach exclusivelyexperienced more cardiovascular problems, more hospitalizations, and earlier deaths.

Diabetes is a disease that has the ability to create a massive distress and burden to an individual and to a nation due to complications associated with the disease (Adler et al., 2003; Forth& Jude, 2011; Gross et al., 2005; IDF, 2011). These researchers provided information on how burdensome diabetes and related stress could be to individuals and countries alike without Self-efficacy and lifestyle behavior modification as shown below:

Figure 3: A flow chart of psychosocial health behavior and self-efficacy.
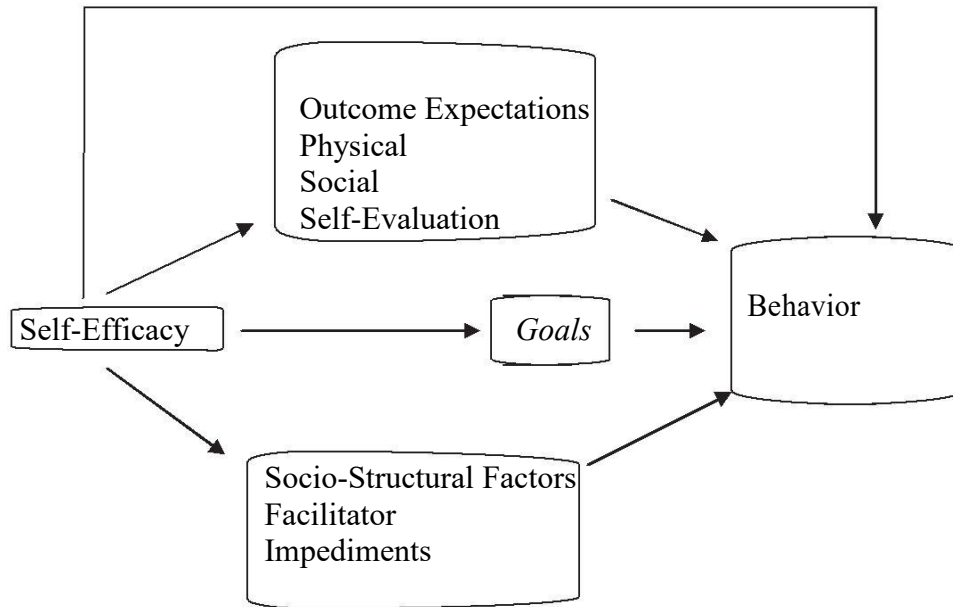
Retrieved from Health Promotion by Social Cognitive Means, by A. Bandura, 2004, *Health Education and Behavior, 31,* (p. 146) with copyright permission from Sage Appendix H. This flow chart shows how self-efficacy affects behavior through the impact on goal setting by theindividual/group that affect outcome expectations directly and in turn lead to behavior change and different health outcomes.

The theoretical presentation in this research study was to synthesize the isolated theoretical constructs into one coherent conceptual framework. The theoretical model of behavior proposed in this study was the health promotion by social cognitive means (Bandura, 2004). The theory is concerned with social and behavioral changes that included environmental (diabetes distress; a factor beyond individual's control) and social elements (including culture, knowledge, religion, and spirituality).Bandura's social cognitive theory inferredthat learningoccurs in a social framework and that the majority of learned behavior was mostly throughcognitive means. Therefore, proposed conceptual framework will attempt to connect diabetesdistress with the above social elements. These theoretical foundations and conceptual framework goals and behaviorare the bases for this research approach, the research questions, and the hypotheses stated below.

Research Questions and Hypotheses

The research questions and hypotheses in this study were as follows:

Research Question 1: Is there a difference in level of diabetes distress in the two regions of residence in Nigeria?

$H1_O$: There is no difference in level of diabetes distress in the two regions of residence in Nigeria.

$H1_A$: There is a difference in level of diabetes distress in the two regions of residence in Nigeria.

Research Question 2: Is there a relationship between diabetes knowledge, culture, religion, and spirituality, and the diabetes distress score?

$H2_O$: Diabetes knowledge, culture, religion, and spirituality have no relationship to the diabetes distress score.

$H2_A$: Diabetes knowledge, culture, religion, and spirituality, have relationship to the diabetes distress score.

Research Subquestion 2A: Is there a relationship between diabetes distress and knowledge?

Subhypothesis 2A:

$H2A_O$: knowledge has no relationship to diabetes distress score.

$H2A_A$: knowledge has a relationship to diabetes distress score.

Research SubQuestion 2B: Is there a relationship between diabetes distress and cultural belief?

SubHypothesis 2B:

$H2B_O$: Cultural belief has no relationship to diabetes distress score.

$H2B_A$: Cultural belief has a relationship to diabetes distress score.

Research Sub Question 2C: Is there a relationship between diabetes distress and religious belief?

Sub Hypothesis 2C:

$H2C_O$: Religious belief has no relationship to diabetes distress score.

$H2C_A$: Religious belief has a relationship to diabetes distress score.

Research Sub Question 2D: Is there a relationship between diabetes distress and spiritual belief?

Sub Hypothesis 2D:

$H2D_O$: Spiritual belief has no relationship to diabetes distress score.

$H2D_A$: Spiritual belief has a relationship to diabetes distress score.

Research Question 3: How well are these two regions in Nigeria represented by the subscales of diabetes knowledge, spirituality, religion, and culture?

Hypothesis 3:

$H3_O$: The two regions in Nigeria are not well represented by the subscales of diabetes knowledge, culture, religion, and spirituality.

$H3_A$: The two regions in Nigeria are well represented by the subscales of diabetes knowledge, culture, religion, and spirituality.

Definition of Terms

Cultural Influence: Culture exerts powerful influences on thoughts, emotions, and behaviors. Culture has the tendency to influence cognitive process, individual perception, and motivational level of a person (Amick, Levin, Tarlov, &Chaptman-Walsh, 1995)

Diabetes Distress: Describes diabetes-associated stress. This condition is distinct from depression but related to diabetes outcome. Even though little is known about diabetes distress, researchers including Fisher (2009) and Forth & Jude (2011) suggested that patients with

diabetes experiences high level of emotional stress due to concerns and worries associated with the disease management.

Diabetes Knowledge: Describes patients' understanding of the diabetes disease. This understanding is manifested using structured questionnaires such as DKQ that could obtain how well a patient is informed on diabetes, management, exercise, healthy diet, self-monitoring, and drug administration (Kolawole*, Adeola, Adegbenro, Akintan,* et al. 2008).

Diabetes Psychological stress: Like diabetes distress, diabetes psychological stress is the mental stress that is associated with diabetes. It underlies certain cognitive functions and behaviors that individuals with diabetes exhibits' that could be related to diabetes outcome (Forth & Jude, 2011; Fisher, 2009).

Diabetes mellitus Type 2 (DMT2): A chronic disease sometimes referred to as noninsulin dependent diabetes or adult diabetes. Unlike other forms, the problem here is twofold: first, the pancreas is unable to produce insulin to use glucose in the blood. Second, the muscles are unable to use glucose in the blood effectively. The high levels of glucose, which remain in the bloodstream, result in many of the complications associated with diabetes (WHO, 2010).

Diabetes pathophysiology: A situation in which diabetes disease causes the body function to change from its normal state through physical, mechanical, or biochemical pathophysiological changes. When the body physiological state is normal, in either the fasting or the fed state, the range of glucose in the body is normal, but beyond that, the shift could result in an unbalance and complicated state (Avdal, Kizilci, and Demirel 2011; WHO, 2010; ADA, 2011b).

Diabetes prevalence: An aggregate number of cases of individuals diagnosed with diabetes in a given population at a given time, and 90% of those individuals diagnosed, are of Type 2 (WHO, 2010). Diabetes prevalence varies in individuals, ethnic groups, and countries.

Impaired fasting glucose (IFG): Is an established guideline for the diagnosis and

classification of diabetes mellitus. This guideline applies when the glucose level in the blood is higher than normal after 8–12 hours of fasting. IFG, also referred to as prediabetes, occurs when the level of 100 mg/dL to 126 mg/dL of glucose has been attained, which predisposes an individual to diabetes (Nathan et al., 2007).

Impaired glucose tolerance (IGT): Like IFG, IGT, also termed prediabetes is a diagnosis and classification criterion used to monitor blood-glucose level for individuals who may be prone to diabetes. These are people whose blood-glucose level is above normal but too low to be categorized as a diabetes during diagnosis. The IGT level from 140 mg/dL to 200 mg/dL after 2 hours of 75g oral glucose tolerance test is considered prediabetes, which predisposes the individual to DMT2 (ADA, 2011a; Nathan et al., 2007).

Metabolic "35 equivalent of task" (MET): The term that denotes the metabolic equivalent of energy intensity a person has expended when the body is at rest. For example, when a person endures three METs of physical activities, the person has spent three times more energy compared to the resting state. A person who spends an hour(s) in physical activity, the METhour is a unit of energy expenditure based on duration. The more MET-hours a person tolerates, the more the glucose use occurs, helping in the maintenance of glucose homeostasis in the body (Sigal, Kenny, Wasserman, & Castaneda-Sceppa, 2004).

Religious Influence: The term used to denote social institutions or entities that are concerned with spirituality. It could influence thoughts, emotions, and behaviors. The study conducted by Rew and Wong (2006), reported an association between religious beliefs and positive adult health-outlook behavior. However, in different study conducted by Williams and Sternthal (2007), suggested that religion could also have a negative impact on health when used to legitimize intolerance, aggressiveness, and even hatred.

Spiritual Influence: Like religion, spirituality could influence thoughts, emotions, and

behaviors. Miller and Thoresen study (2003) defined spirituality as individuals experiences, acts, and/or feelings in their solitary moments.

Socioeconomic status: Refers to a combination of factors such as education, income, and occupation that could potentially affect group or individual health in a society. It could have an association with structural location and time factors. For example, the standard of a person's education could influence their occupation. Occupation could in turn influence income, which could determine one's neighborhood environment (Brown et al., 2004; Hankonen, Absetz, Haukkala, &Uutela, 2009). Neighborhood environment includes grocery stores, recreational facilities, and educational resources, and other social amenities that could determine the type of diet and physical activity in which an individual indulges.

Assumptions

There were several assumptions made in this research study. I assumed that participants would answer questions truthfully based on their distress, knowledge of DMT2, cultural, spiritual, and religious beliefs. I assumed that participants would understand and respond appropriately to the survey questions in its context or the intended manner and not outside context. I assumed that confounding variables such as education and sex might suggest a correlation between the dependent and the independent variables that does not exist (false positive relationship).

Scope and Limitations

Even though there are people diagnosed with DMT2 less than 25 years of age, the majority of those diagnosed are between 25 and 79 years of age. In this study, I investigated the extent to which knowledge, spirituality, religion, and culture, were associated with diabetes distress in participants between those ages residing in the northern and southern parts of Nigeria.

The study population included male and female participants who were receiving care (patients) at the teaching hospitals in the northern and the southern regions of Nigeria. The sample consisted of approximately 134 adult males and females from each hospital as discribed in the methodology section of Chapter 3. Variety of questions adapted from surveys including DDS, DKQ, HAKABPQ and the 2000 U.S. census were used in data collection.

In this study, I mentioned DMT1 but did not address it, as the focus of my study was DMT2 distress. Any behavioral research study is an attempt to simulate real-world knowledge using data collection to describe respondents' behaviors. Nigeria has tribes with varying culture, religions, and spirituality. The three major tribal languages Hausa, Yoruba, and Ibo are the three most populous tribes in Nigeria. The Yoruba tribe and the Ibo are located in the south andsoutheast regions while the Hausa and Fulani tribes are located in the north and north west regions. The Hausas' and the Fulani are mostly Muslim, the Ibos' are mostly Christians, and the Yorubas' are mixed faiths (Muslims and Christians). The national language in Nigeria is English but not all speak it. However, I will survey only those who understand and speak it. It is the spoken language in most urban areas in Nigeria. Choosing these two geographic urban locations ensures English speaking areas and a proper representation of different segments of the country. It will eliminate translation (and then back-translation) of the survey questionnaires from English into three different languages.

The selected sample size of 134 participants is an adequate effect size and the 1-2 months study period is an adequate time. This quantitative correlational research was designed to predict a causal relationship between the dependent variable diabetes distress and the independent variables (knowledge, spirituality, religion, and culture) based on the two regions. The aim of the

causal-relationship is to produce positive test outcomes of cause and effect relationships.
Thebases of association between the variables may not be a causal, but could be explained in
another

way. Drawing causal conclusions from the correlation between these variables could result in

logical error, as other variables may be involved. The study did not include patients outside the

study period that may satisfy the criteria for inclusion. No responsiveness or missing value bias

did not constitute a limitation. There were a very few nonresponsive participants' and a few

missing data from the respondents. The selection bias that usually arises with the use of

convenience sampling method was limited due to the use of large sample size (134).

Epidemiological studies in Nigeria or in any other Sub-Saharan African countries are

difficult due to limited information on chronic diseases such as diabetes and associated distress.

The existing data sources used unmatchable and no homogenized methods that were

difficult tomeasure. Obtaining data in Sub-Saharan Africa countries was not only expensive, but

laborintensive (Gill, Mbanya, Ramaiya, & Tesfaye, 2009). The populations being studied often

change locations, resulting in difficult data analysis. Convenience-sampling technique was

anideal method for this study.

Significance of the Study

Diabetes distress, particularly DMT2 that constitute the majority of the diabetes

diagnosis, is a concern for epidemiologists (WHO, 2011b). The modernization of many areas in

the global south had led to changes in diet that is higher in calories, sugar, and fat while reducing

physical activity. People worldwide are migrating from rural to urban areas in search of better

income, modernization, and a better life (Yang et al., 2010). Over the past several years, Africa

had seen a gradual increase in diabetes, particularly DMT2 (IDF, 2011). Nigeria is among the

low- to middle-income countries that would reach 50% or more in death-related diabetes

complications by 2030 (WHO, 2010). Understanding psychological stress associated with diabetes management may reduce the overall mortality rate caused by diabetes.

It is conceivable that life with diabetes is demanding and may affect an individual's health- related quality of life (HRQoL). According to Polonsky et al. (2005), the demands diabetes places on individuals are often confusing. This may be the result of problems and hassles associated with culture, religion, spirituality, inadequate knowledge, and psychological stress. The various self-care requirements arising from diagnosis and management could discourage, frustrate, and overwhelm patients. If not managed properly, the added psychological stress could result in distress, depression or even conflicts with family members and health care professionals. Additionally, the patients' relationships with health care providers may suffer as aresult.

Diabetes in Nigeria

According to Gill et al. (2009) and IDF (n.d.), the entirety of African countries had an estimated 13.6 million people with diabetes and Sub-Saharan African countries including Nigeria had 7 million people with diabetes. The Sub-Saharan African estimate is expected to increase to 15 million by 2025. In the Sub-Saharan Africa, Nigeria was among the countries with highest number of people with diabetes (3.1 million) and impaired glucose tolerance (3.85 million). In Africa, there are approximately 53 countries and Nigeria had the fourth largest number of people with diabetes (IDF, n.d.). The other three were Botswana with 3.6 million, and South Africa and Sudan with 3.4 million each (Gill et a., 2009). The Gill et al. (2009) report suggested that the increase in diabetes in Nigeria and other Sub-Saharan African countries was associated with the following four major problems and barriers. The inadequate facilities and limited structure of diabetes-care was a contributing factor. Limited training on diabetes and staffing problems that

were compounded with lack of resources were also significant contributors. Lack of preventive strategy and communications among professionals and a lack of organized healthcare information system to involve other professionals and integrated ideas with other communities in the country was noteworthy.

Gill et al. (2009) suggested that the major contributing factor to DMT2 and perhaps associated distress in Africa, including Nigeria, was migration from rural to urban areas. According to an IDF (n.d.) study conducted in two African countries—Tanzania and Cameroon—the urban to rural ratio of diabetes population is 5:1 and 2:1 respectively. Perhaps, the differences were associated with lifestyle change, such as the availability of a high-calorie diet, large quantity of food, and accessibility of transportation that decreased physical activity, thus, contributing to increased stored calories (Gill et al., 2009).The increased migration to urban area may be correlated with increased DMT2 andpsychological stress, which is 90% more prevalent than DMT1 (WHO 2010). The discovery ofthis disease in Africa first occurred in 1960s and was followed with a report from Nigeriadescribing patients with hypoglycemia who were able to switch between insulin-injectiontreatment and oral-medication treatment and vice versa (Gill et al., 2009). It was noted that thosewith ketoacidosis but without islet-cell antibodies were also able to switch from insulin to oralmedications and vice versa.

Nigeria, like many African countries is faced with infectious diseases such as Malaria and HIV/AIDS, may have contributed to the minimal availability of literature and data in chronic diseases (diabetes) and associated stress. Chijioke, Adamu, and Makusidi (2010) stated that diabetes prevalence in Nigerian in 1998 was 2.2% and in 2003 was 6.8%, However, their own study report found diabetes prevalence to be 5.12%. Chijioke et al. noted that the average mortality rate among DMT2 in Nigeria is 32.5%. The male population has a mortality rate of 35% and the female population has 29%.

According to Ogbera, Chinenye, Onyekwere, and Fasanmade (2007), diabetes was responsible for up to 15% hospitals' medical admissions and 22% deaths rate in Nigeria. Chinenye et al. suggested a frequency of 40% admission and 46% death rate for hyperglycemia the leading cause of diabetes-associated illnesses. The admission and mortality rate is 56% and 57.6% respectively and it is highest among those aged 35–64 years. Surprisingly, it is lower for those 65 and older, at 34% admission and 36.4% death rate. Further study as to why the conventional wisdom is not the case here may be necessary. Other diabetes complications such as gangrene and diabetic foot ulceration accounted for 40% of limb amputations and diabetes ketoacidosis accounts for 35% with an extremely bad infection, resulting in 25% mortality in the country (Chijioke et al., 2010).

Prevalence of Diabetes

Chronic diseases such as diabetes, heart disease, stroke, and cancer are a growing public health concern worldwide. Historically, age-associated diseases such as DMT2 have been restricted to elderly populations; however, Haines (2007) reported a noticeable increase worldwide among younger populations between the ages of 15 and 24 years. Altogether, in 2000 32 the prevalence was 2.8% or 171 million people among all age groups (Wild, Roglic, Green, Sicree, & King, 2004). Shaw, Sicree, and Zimmet (2010) suggested a worldwide prevalence of 6.4% or 285 million, and could rise to 7.7% or 439 million by 2030. The global south Nigeria included would experience a 69% rise in diabetes prevalence while developed countries would increase with a moderate 20%. Even though the global prevalence of all types of diabetes is increasing, the prevalence of DMT2 is alarming. According to WHO (2010, 2011b), DMT2 represents 90% or more of all diabetes cases and it is even higher in populations older than 65 years.

Diabetes prevalence was not limited to people in the United States and other developed

countries. The increasing diagnosis of diabetes in the global south once considered exempt from the disease, and associated psychological distress is alarming (IDF, 2011). For reasons not fully understood, the disease burden seems to increase with increase in prevalence (WHO, 2011b). The reasons may be due to poor health care, limited services, psychological stress, and health care accessibility (IDF, 2011; WHO, 2011b). With this increase, the distress would increase as well (Fisher, 2009; Forth & Jude, 2011). The economically disadvantaged populations in the low- and middle-income countries in Africa would experience increased diabetes-associated mortality up to 80% (WHO, 2011b). The research study conducted at the University of Port Harcourt Teaching Hospital in Nigeria Africa by Nyenwe, Odia, Ihekwaba, Ojule, and Babatunde (2003), suggested that diabetes was the cause of several cases of morbidity and mortality. In addition, they noted that the prevalence of undiagnosed DMT2 was 40% and asymptomatic patients were 80%, giving rise to a need for further investigation. Nigeria is a global south country in Africa, as depicted in Figure 4. The areas with dark-blue color represent the largest populations with diabetes in Africa (IDF, 2011). In 2011, this area has 14.7 million people with diabetes and could rise to 28.0 million by 2030: a 90% increase. The rest of the world in 2011 had 366.2 million people with diabetes and this number could rise to 551.8 million by 2030, equivalent to a 51% increase (IDF, 2011).

***Figure 4*:** Map of Africa depicting diabetes mellitus Type 2 geographical locations.

Map: IDF Regions and global projections of the number of people with diabetes (20-79 years), 2011 and 2030
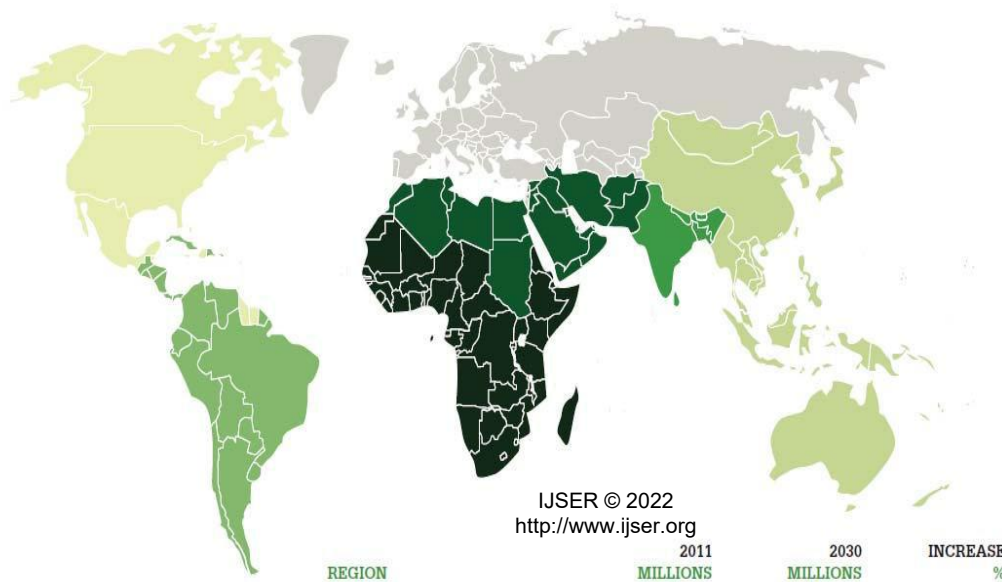
From *IDF Diabetes Atlas Fifth Edition*, by International Diabetes Federation, 2011, retrieved from http://www.idf.org/ with copyright permission from IDF

DMT2 is spreading in men and women, as indicted in the study conducted by Nyenwe et al. (2003). They noted that DMT2 was a nondiscriminatory disease and that it affects men and women almost equally. Yang et al. (2010) study on men and women 20 years and older in 14 provinces, was slightly higher in prevalence among males. It is important to note that their study included participants previously diagnosed with diabetes, previously undiagnosed with diabetes, and those diagnosed as prediabetic. Although many diabetes studies had taken place in various parts of the developed world, few have taken place in global south. Perhaps, due to a lack of research and inadequate record keeping that made it difficult to access recent studies. I used the earlier studies in addition to recent studies to obtain sufficient and meaningful information. Nyenwe et al. (2003) study of DMT2 in Sub-Saharan Africa was between 1 and 2% in diabetes prevalence. This prevalence largely comprised of DMT2 rather than the DMT1 population. It is possible that sudden increase of DMT2 in global south could have an association with overweight and obesity, diet, cultural, religious, and spiritual beliefs, the populace knowledge about diabetes, and physical-inactivity.

Culture and Chronic Diseases

Public health social and behavioral sciences focus on the importance of behavioral,

social, and cultural factors that influences individual and population health (Amick, Levin, Tarlov, & Chaptman-Walsh, 1995). The differences in the way individuals or the populations perceive disease and symptoms are essential in managing the disease. The way individuals or groups perceive disease could lead to a favorable or unfavorable health-seeking behavior (HSB), how they relate to health education and promotion, and medication regimen adherence. Ultimately, this may be reflected on the disease incidence, prevalence, burden, distribution, distress, and mortality rate.

Understanding the influence of culture and its effect on chronic diseases such as diabetes is to understand the psychological stress and the organization of health belief model a well known social cognitive model. This psychological model helps explain, and in many cases predict health behaviors, which is a blend between biophysical and cultural perception (Forth & Jude, 2011). Culture means different things to different people depending on their frame of reference. However, for the purpose of this study, I used a combination of definitions provided by the following authors Berry, Samos, Storti, and Grey (2009), Naeem (2003), Oomen, Owen, and Suggs (1999), and Turner (1996). Together they defined culture as shared or personal and social experiences, as well as upbringing and choices undertaken by individuals or groups that shape their behaviors and attitudes that vary from the expected norm. According to Turner, culture could determine chronic-disease outcome if a group or individual believe differs from proven medical chronic-disease diagnosis, management, and treatment. Therefore, the differences between professionals and patients in the belief of origin and cause of chronic diseases could determine the health outcome.

For example, the Zulu part of Africa believed that witch doctors or sorcerers only, have the power to infect individuals with a disease. Therefore, when medical professionals suggested hospitalization to the parents of a young girl with turbeculosis to avoid transmitting the disease

to others, the parents refused, based on their cultural belief. They believed hospitalizing their daughter signifies an admittance to being a witch. Another cross-cultural study involved 335 British students at the University of London and Ugandan students at Makerere University. This study was conducted by Forth and Jude (2011) to determine the differences in illness beliefs among these groups of students from the 2 universities. The students' were questioned on their perception of current and future illnesses, causes of illnesses, and the nature of recoveries. Their findings alluded to major significant differences between the two groups. The Ugandan students strongly believed that there were supernatural determinants of their health. The British students believed these determinants were not essential to their current or future health condition. The Ugandan students also believed that western medicine is associated with current and future health and illness, unlike the British students' belief.

Cultural Influence on Diabetes

The management of DMT2 like many other chronic diseases is attained through an individual patients' adherence to regimen. Knowledge, cultural beliefs, religion and spiritual beliefs could play a considerable role in the management of psychological stress. This is evident in the HIV/AIDS study conducted by Njie-Carr (2009). Her work demonstrated the influence of knowledge, culture, religious, and spiritual beliefs toward HSBs. The study population included men and women, Muslims and Christians among Gambian population. Her participants comprised of 6.5% poorly educated population that could not read or write. She noted that cultural belief and negative attitude adversely affected HSB.

In a different study conducted by DePue et al. (2010) on a group of Samoans living in U.S. territory with DMT2, further supported the influence of culture and negative health outcome. They noted that cultural beliefs merged with problems in translations hindered the efforts to intervene and reduce diabetes prevalence among those aged 18 years and older by

21.5%. Comparing those statistics to the U.S. rate of 10.7% for those aged 20 years and older, suggested that cultural saliency and competence was necessary in public health interventions that have evidence of variability across groups. A different study to determine the influence of culture conducted by Berry et al. (2009) on a Native American community with DMT2, noted the same negative HSB. They suggested that it is important to develop culture-specific sensitive programs in prevention and management of diabetes. The culture-specific sensitivity applicable to individuals, their family members, and the community with varying cultures such as Nigeria, is immeasurable.

Even though the national language in Nigeria is English, the non-Arab Muslim population of northern Nigeria has learned how to read the Quran, influenced by their culture, religion, and tradition that affected diabetes management and psychological outcome to treatment (Naeem, 2003). Cultural influences were found in global south and developed nations. A good example to cultural influences is found in the country of Kashmir, where an ineffective management of overweight that could lead to diabetes (Naeem, 2003) noticeably hinders cultural beliefs and perception toward health. Naeem's study suggested that 96% of the study population believed that being overweight does not negatively influence their health. In addition, 82% acknowledged that health professionals communicated the danger associated with overweight to them. However, only 42% actually believed they were overweight.

The influence of culture on HSB was also noticeable in Thai community. The cultural and religious practices accounted for 94.6% Buddhists, a belief system that shaped the culture and attitude of the people (Naeem, 2003). These beliefs could prevent a full understanding of health and disease management, as well as the risks associated with a disease. These strong cultural influences were not limited to a particular geographic region or population; they were noted among Blacks (including Nigerians). According to Naeem (2003), American Indian,

Blacks and Hispanic/Latino people constituted 90% to 95% of the worldwide population with diabetes. These groups of population have cultural beliefs that were specific to them and were among the echelon of lower socioeconomic groups based on their income, education, occupation, and social status.Culture is an avenue through which information disseminate from generation to generation. The Hispanic women who believe that diabetes is a punishment from God may have obtained this belief from past generation, and other cultures, could have similar beliefs (Naeem, 2003). This supposition again supports the need for further investigation of cultural associations with diabetes management in Nigeria. Scholars have observed cultural influence and their impact on diabetes knowledge, cultural, religious, and spiritual groups' involvement on HSB. They are yet to thoroughly explore how to provide their findings to health practitioners to ensure a prevention/reduction in diabetes-disease morbidity and mortality. The idea that culture is a shared experience helps to explain Blacks, American Indian, and Hispanic/Latino peoples, representing 90–95% of the diabetic population (Naeem, 2003). The view that diabetes requires self-management is factual. However, based on societal beliefs, cultural and religious attitudes

Religion Influence on Diabetes

Religion is an essential method of coping with health-related problems in many cultures around the world. The major religions practiced in various parts of the world include Christianity, Hinduism, Judaism, Islam, Sikhism, Jainism, and Buddhism. The two majors religions in Nigeria are Islam and Christianity. Prayer is the focal point of many religions and often used as a powerful disease-coping mechanism. Individuals and groups view religion from many different perspectives. However, for the purposes of this study, religion will be viewed through the prism of definition offered by Miller and Thoresen (2003). They suggested that religion is associated with social institutions or entities that are concerned with spirituality. As stated earlier, Nigeria has two major religious groups—Islam and Christianity—that

comprise the majority of the population (Bodmin, 1999; CIA, n.d.; Lalasz, 2006). According to

Lalasz, (2006), the majority of the population in Nigeria, residing in the northern part of Nigeria,

are mostly Muslims (50.45%), whereas Christians, who live mostly in the south and southeast

are about 48.2% of the population. The remaining 1.4% is comprised of traditional believers. The

United State *Central Intelligence Fact Book* placed Muslims at 50%, Christians at 40%, and

traditional believers at 10% (CIA, n.d.). Islam and Christianity are mainly the two majors

religions practiced in Nigeria.

The religious views of the northern and southern regions of the country, seen through the

prism of behavioral patterns, and how they relate to health/disease status, and the world around

them could translate into effective management of diabetes and associated psychological stress.

Numerous studies have linked positive physical, psychological, and cognitive outcomes to

religion and spiritual beliefs. A study performed by Rew and Wong (2006), reported association

between adult religious beliefs and positive health-outlook behavior. In addition, their report

suggested that religious beliefs could enhance hope and confidence in dealing with diabetes and

perhaps associated distress. According to a study conducted by Bergin (1983), the view on

religion, mental health, and well-being was associated with the reduction of incidences of

anxiety and depression in patients with diabetes.

Spiritual Influence on Diabetes

Spirituality like religion is an essential coping mechanism for illnesses and diseases.

Spirituality is a topic with vast research literatures. Literatures agree that spirituality is necessary

in many peoples' lives. However, many disagree with spirituality relative definition. This

research study will use definition provided by Miller and Thoresen study (2003), which defined

spirituality as individuals' experiences, acts, and/or feelings in their solitary moments. According

to study conducted by Johnson, Elbert-Avila, and Tulsky (2005) on spiritual beliefs and African

Americans treatment preferences, suggested that blacks were more inclined to spiritual belief than white, and prayers was a vital means of coping with diabetes psychological stress.

The African American spiritual belief presumes that the power of life and death decision is held by God only. Their national survey, which included very ill patients, physicians, and members of bereaved family, suggested 70% of patients were spiritually cognizant on diagnoses of an illness or a disease. However, this kind of belief, even though beneficial as a disease coping mechanism, could also be harmful if it is influenced by psychological stressors such disease knowledge, economic situation, social structures, and other personal problems (Curlin et al., 2005). These stressors could influence patients' decision in adhering to medication, physical activity, and diet regimen that could improve QoL.

Perhaps the linkage between patients' spiritual practices and many aspects of life that may influence feeling of optimisms, coping mechanisms, outlook on health and illness, could provide a clue on how to manage diabetes related stress while improving QOL among sufferers in Nigeria. According to study published by Polzer, and Miles (2007), bible readings and relationship with God influences spiritual beliefs among African Americans with diabetes. This translated into better self-management of the disease. These participants believed that God is working for them in the background and in forefront. They also believed that God is their healer on the item that contained relationship with diabetes and hence the relinquishment of self-management.

With such spiritual beliefs, it would be difficult for the patient to adhere to medication, diet regimen, and physical activity that could translate into an ineffective management that could lead to better QoL.

Diabetes Knowledge Influence

Knowledge is a vital component in managing chronic diseases including diabetes.

Knowledge and education are related to each other. However, education is a formal process of acquiring knowledge. Knowledge on the other hand is an informal experience that educates a person. Education in the management of DMT2 and its stress are two-folds: first, the education on how to avoid DMT2 and its psychologically associated effects. A change in behavior including healthy dieting, physical exercise, and routine medical checkups will be necessary to achieve this aim. Secondly, if the disease had already occurred, education is an essential tool in the management of the disease particularly DMT2.

Knowledge acquired through education and experiences will greatly assist in the reduction ofstress associated with DMT2. This view was supported by Kolawole, Adeola, Adegbenro, Akintan, et al. (2008), using structured questionnaires on two group of populations in Nigeria. The two groups constitute patients that were members of Diabetes Association of Nigeria (DAN) and non-members. The study motive was to ascertain the effect of knowledge on diabetes self-management and stress reduction. They concluded that DAN members were more knowledgeable on issues of diabetes to a greater degree than non-members were. However, diabetes education should not be limited to organizations such as DAN but to the entire Nigerian population. Efforts to include all available tools and resources such as internet education and pamphlet distributions may be necessary.

A randomized controlled study conducted by Avdal, Kizilci, and Demirel (2011) to compare internet and a group-based training; suggested that the internet can be a useful tool for chronic diseases education; particularly for type 2 diabetes patients in Nigeria. The study set out to find if there were any differences in level of attendance and reduction in HbA1c tests (2011). The HbA1c test is used to monitor diabetes patients' compliance. Their findings included higher attendance in those participating in internet education when compared to group-based training.

The internet participants were able to obtain information and support through the website network. This tool (internet) could reduce the number of diabetes-associated stress and may improve self-management. Nigeria being a global south, where majority of the populations are poor, internet is not available to every household. Therefore, the idea of internet education might be met with several challenges. Internet education in combination with others forms, could bring awareness to diabetes distress which could perhaps improve the management of distressed patients' in Nigeria.

Diabetes Oxidative Stress Risk

In order to manage diabetes distress effectively, it is important to examine the associated factor. Diabetes oxidative stress risk is associated with chronic DMT2. Oxidative stress, defined as excess formation of highly reactive molecules and/or the body's inability to remove these molecules that may lead to increase oxidant in animal cells (Yang et al., 2011). This increase in the production of oxidants is marked by the release of free radicals (FRs) generated by the environmental factors such as cancer-causing chemicals and ionizing radiation or the mitochondria metabolic processes (2011). The environmentally generated FRs in reactive oxygen species (ROS) such as superoxide (O_2-), hydroxyl ($OH-$), peroxyl ($C_3H_2O_2-$), hydroperoxyl (HRO_2-) nitric oxide (NO), and nitrogen dioxide (NO_2-) could contribute to diabetes. The FRs could initiate internal or external destruction of lipids, proteins, and nucleic acids. This destruction could cause damage to pancreatic beta cell leading to insulin resistance if excess glucose metabolite travels through this pathway. Ultimately, this could lead to or complicated diabetes disease and may in turn increase stress.

Diabetes Distress

In order to understand stress involvement in diabetes, it is important to describe its impact on mental and physical well-being. Having gone through many stresses myself, I could

describe it as a reactions or response to specific event, situation, or challenge that could cause the body physical, mental, or emotional tension. This tension could complicate diabetes by preventing focus on proper care such as competent monitoring of blood glucose levels, adhering to treatment regimen, or participating in regular exercise or physical activities that could reduce diabetes complications and improved QoL (CDC, 2011d).

Stress has been in existence for several centuries. However, it was not until 1930s that Hans Selye (Pouwer, Kupper, and Adriaanse, 2010) first formulated the concept "stress." Selye built on the fight-or-flight concept developed by Cannon and in 1950, and defined stress as "the nonspecific response of the body to any demand." Since then, the concept stress has changed from the original definition to include response to emotional, physical, and even behavioral experiences at cognitive level.

In two the meta-analysis studies conducted by Pouwer, Kupper, and Adriaanse (2010), they noted that diabetes incident risks were 60% higher in participants that are depressed when compared to control group consisting of non-depressed participants. Their report also suggested a correlation between stress and diseases, which is included in the report of an English physician named Thomas Willis over 400 years ago. His work in 1621 through 1675 investigated the significant of life stressors including sadness and long sorrow with development of diabetes, which were significantly influential in the development and management of diabetes. Later studies, as noted by Pouwer, Kupper, and Adriaanse (2010), suggested that 80% of diabetes incidences were associated with stress related phenomenon.

Fisher et al. (2009) reported that diabetes distress condition has a relationship with diabetes outcomes and the long-time distress was more likely in female than male. In their diverse community sample of 506 participants using DDS, they reported 18% high diabetes distress among the participants. Their follow up study revealed additional 17.2% participants

with high diabetes distress a persistent psychological state that could last a long time.

Diabetes Distress relationship to knowledge, culture, religion, and spirituality

Patients' knowledge of diabetes disease, causes, and medical treatment including medication adherence, are essential in reducing diabetes related distress and improving outcome. An appropriate patients' education in diabetes self-management could result in diabetes-related psychological and behavioral changes that could ultimately improve QoL. The randomized controlled study conducted by Avdal, Kizilci, and Demirel (2011), noted that diabetes patients' knowledge and education in the disease pathophysiology and pharmacology were better managed particularly the monitoring of HbA1c.

A recent national health and nutrition examination survey conducted by Funnell, M. M. (2006) on diabetes patients' attitudes, wishes, and needs indicated that only 42% of adults with diabetes had HbA1c values < 7% (normal value) and 20% had levels ≥ 9% (abnormal value). The study further indicated that at the time of diagnosis, 85.2% of the participants had high level of stress that include shock, guilt, anger, anxiety, depression, and helplessness. Later in these patients' lives, long after the diagnosis, the problems of living with diabetes complications, social, and psychological burdens remained the focal point. Additionally, 41% of these patients had low QoL. This indicated that patients' knowledge in diabetes distress and self-management is extremely important because it ultimately translate to better outcome.

Spiritual and religious beliefs particularly among people with strong cultural and ethnic affiliations could constitute a problem in diabetes distress management. For example, cultural and spiritual beliefs among blacks, including African Americans, indicated bible readings and God could greatly influence disease self-management (Polzer& Miles, 2007). Newlin et. al. (2008), conducted a cross-sectional descriptive and correlational study on 109 blacks' women with DMT2 using convenience method. They concluded that spiritual and social support were

effective methods of coping with emotional distress and glycemic control. This could translate into better psychological outcome that ensures better QoL. Even though there was a relationship between religion/spiritual beliefs and glycemic control, their regression model lacked the evidence of psychosocial mediation. Therefore, further study may be necessary to support evidence of psychosocial mediation.

A study of 49 participants using Meta-analysis statistical technique noted religious beliefs association to positive coping mechanisms influences on depression, anxiety, and distress (Williams &Sternthal, 2007). These findings suggest that religion and spirituality should be included in professional care of diabetes distress patients; if a better outcome is expected. Additionally, if religious and spiritual beliefs were included in patients' professional care, one could expect healthy dieting, regular exercises, better medication adherence, and improved glycemic control.

As indicated earlier, cultures had a considerable influence on the psychological stress and management. The HIV/AIDS and diabetes studies conducted by Njie-Carr (2009) and DePue et al. (2010), noted that cultural belief and negative attitude adversely affected HSB toward the disease. If advocated properly, culture could assist in HSB and could positively influence psychological stress associated with diabetes. This in turn may translation into lower distress, better distress-management, and may greatly improve QoL.

The study conducted by Skelly et al. (2009) on African Americans women over the age of 60 years with DMT2 and HbA1c >7% for more than 1 year, noted that culture was an important part of disease management. The study intention was to ascertain the effectiveness of symptom-focused, weight, and diet intervention within a population of known culture. Their report suggested that cultural intervention might still be possible; even with hindrances that could affect disease-management. Their study noted an average drop in level of HbA1c between

0.57% and 0.76% among the entire participants and participants who received the booster telephone calls. The baselines for the participants were 3, 6, and 9 months. Culture, even though influential in diabetes management, could be controlled with proper patients' education and intervention. This may translate into better QoL and outcome.

Implications of diabetes distress in terms of disease management

Disease management, which constitutes coordinated efforts of health care interventions and patients' self-care, could significantly improve QoL and outcome. The health care intervention could improve patients' diabetes distress, management skills, and reduced stress. The studies conducted by Pouwer, Kupper, and Adriaanse (2010) and Makine et al. (2009) to determine the effect of stress in diabetes management suggested that patients with diabetes distress had negative acceptance to insulin use and HbA1c monitoring. The studies noted that the major reason for the negative acceptance is not fear of injections but stress associated with the lack of knowledge and the impact insulin therapy could have on their social surroundings. The participants were more concerned about the perception people might have about them relating to their inability to manage diabetes with diet or tablets. In the study conducted by Funnell (2006), the participants with diabetes distress reported lower self-management behaviors outcome particularly toward diet and exercise. Diabetes distress and management are interrelated because a well-managed distress is a well-managed diabetes disease.

It was noteworthy that participants' with DMT1 were found to comply with all recommendations upto 19.4% and then those with DMT2 who complied about 16.2% of the time. Funnell (2006) study also noted that adherence was even worse at 2.9% for DMT2 compared to 7.3% DMT1. Perhaps, diabetes distress being a common concern among healthcare providers; could shed some light on the importance of the disease self-management in DMT2 and stress.

The Long-term effects of diabetes distress on QOL and co-morbidities.

The long-term effect of diabetes distress could greatly influence diabetes and other conditions that coexist with the primary disease (Skelly et al., 2009). This also could reduce QoL and complications among individual sufferers. For example, the United Kingdom diabetes prospective study noted a 1% decrease in HbA1c equivalent to 35% reduction in micro vascular disease risk including retinopathy, nephropathy, neuropathy, and cardiovascular ailment (2009). Their study indicated that DMT1 vigorous monitoring was associated with lowering heart rate compared to participants' who had elevated hyperglycemia and higher heart rate who did not participate in the monitoring. The higher rate observed in these participants could be linked to cardiovascular disease suffered. It is worthy to note that a long-term study monitoring decrease in macro vascular glycemic control in people with DMT2 disease were few.

The study by Skelly et al. (2009) suggested that diabetes quality monitoring, could lower HbA1c, thus reducing the cardiovascular associated risk up to 42% in all cases. A better monitoring of diabetes distress could reduce non-fatal myocardial infractions, stroke, and cardiovascular disease deaths up to 57% (Skelly et. al., 2009). However, metabolic syndrome associated factors may significantly contribute to decrease in the risk of cardiovascular and diabetes disease.

Relationships between Religion and Spirituality in Diabetes Management

As stated earlier, religion and spirituality are important aspects of coping with illnesses and diseases in many parts of the world including America. In America, 67% of the population believes religion is very important aspect of their being and 96% of them believe in God while a reduced number of 46% attend religious services (Powell, Shahabi, &Thoresen, 2003). Even though religion and spiritual beliefs can provide psychological and emotional relieves or positive health outcome, many were skeptical that they (religion and spiritual beliefs) could reduce

disease risks and deaths. A study performed by Rew and Wong (2006), supported the association between religion/spiritual beliefs and positive adult health outlook. They addition, suggested that religion/spiritual beliefs could enhance hope and confidence in dealing with chronic diseases including diabetes.

Newlin, Melkus, Tappen, Chyun, and Koenig (2008), conducted a convenient sample study to determine the relationships between religion and spirituality to glycemic control in diabetes patients. The study samples involved 109 black women, average age 48 years with DMT2. Their report alluded that blacks with or without diabetes have higher rates of depression, psychological distress, and other measures of association with mental health and well-being. However, they admitted that more research might be necessary to understand the lack of evidence supporting emotional distress toward glycemic control. The thought that religion and spiritual beliefs could directly or indirect affect patients' mental health, social support, and treatment adherence, and could improve or worsen the disease self-management and health outcome particularly psychological stress that could improve glycemic control are very important in diabetes disease management.

Introduction of Religion/Spirituality to Northern and Southern parts of Nigeria.

The northern and southern Nigerian cultures are tied with religious and spiritual practices (Harris & Mohammed, 2003; Nya, Okorie, & Eka, 2010; Uzoma 2004). Christianity, introduced to the southern portion of Nigeria by different foreign and European missionaries after the conquest of the area, purports different cultural beliefs from the Islamic populations in the north. Muslim merchants from North Africa, participating in the trans-Saharan trade introduced Islam to the northern region (Sodiq, 2009 & Uzoma, 2004). Even though both religions had spread beyond their major centers, as there are some Muslims found in the south and a few Christians in the north, the majority of the Muslims still live in the north and majority of the Christians still

occupy the south and the southeast portions of Nigeria.

The people in the south have abundant food due to favorable conditions. Perhaps, that may have contributed to overweight and obese population among their residents. To exacerbate the situation, some cultures in the south and southeast psychosocially encourage overweight. However, these people are poorly educated about overweight/obesity-associated diseases and therefore, do not know or are ignoring the ramifications (Mbada, Adedoyin, &Odejide 2010; WHO, 2011c). The situation could be made worse if the patient was predisposed or at risk for developing diabetes.

Self-Efficacy

Diabetes self-efficacy (DSE) is one of the tools in the management of diabetes disease. This tool has been studied using different research designs and methodologies to evaluate and predict various health behaviors in glycemic control worldwide. DSE and the management regimen study including insulin management, psychological stress management, diet regulation, physical activity, and glucose monitoring studies had been done on DMT2 populations. The study scales used included the Diabetes Self-Efficacy scale, Diabetes Self-Management scale, Diabetes Distress Scale, and Diabetes Self-Care Agency scale (Sousa, Hartman, Miller, & Carroll, 2009; J. Wang, and Shiu, 2004).

They concluded that the respondents were better able to manage the disease with self efficacy training. Various investigations including Cherrington, Wallston, and Rothman (2010), Plotnikoff, Brez, and Brunet (2003), Dutton et al. (2009), Hankonen et al. (2009), McClosky andFlenniken (2010), and Sousa et al. (2009) suggested relationships between DSE and othervariables including depression, diet, cultural barriers, physical activities, diabetes distress,knowledge, religious and spiritual beliefs. These variables are essential to the management of thedisease with the use of reliable and valid instruments/scales. The information

discerned fromthese studies would assist in planning and executing intervention programs that would ultimatelyimprove glycemic control, and delay or even prevent complications from diabetes.The major variables that could influence self-efficacy and affect self-management of DMT2 are depression and distress (Cherrington, Wallston, & Rothman, 2010). Depression even though different from distress had a similar effect on diabetes sufferers (2010). The relationship between depression, distress, and self-efficacy in glycemic control undoubtedly is of great consequence to disease management. For example, a cross-sectional study to examine the relationship between depression and self-efficacy on glycemic control among men and women with DMT2, revealed a significant correlational value of 0.34 ($p < 0.01$) for men, and women 0.5 ($p = 0.59$).

However, a cross-sectional study conducted by Zuberi, Syed, and Bhatti (2011), inKarachiPakistan,using a larger sample contradicted the 2010 findings. Their results suggested a meaningful difference; women were significantly affected up to 60.8% when compared to 38.2% of men ($p = 0.03$). The study also noted that patients attending the Karachi clinic who were depressed had a family history of depression that accounted for 32.2% of the diabetes population, compared to 20.3% of patients with no family history. Even though a relationship exists between glycemic control and depression in men and women, to my knowledge, no study performed to date has established the reason for the relationship.

According to Cherrington et al. (2010), race and age were not predictors of low self-efficacyand poor glycemic control. This view was supported with $p = 0.68$ and $p = 0.94$ for ages 18 to 94 years. However, depressed men with diabetes had no significant relationships with poor glycemic control. On a larger scale, a survey study of more than 240,000 people in 60 different countries, conducted by Andrews and Titov (2007), suggested that depression health scores worsened when combined with other chronic physical disease. This evidence suggested an

association between chronic physical disease and depression.

Moussavi et al. (2007) investigated this link with 245,404 participants from 60 countries from all regions of the world. The researchers suggested that 9.3% to 23.0% of people with chronic physical disease had significantly higher likelihood of depression compared to those without chronic physical disease $p < 0.0001$. In addition, depression had the highest mean health scores when examined in contrast to other chronic conditions, even with adjustment for socioeconomic factors and other health conditions including stress. Having a chronic disease such as diabetes could increase an individual's stress level.

Although depression and distress are negatively associated with self-efficacy, physical activity is positively linked with self-efficacy and other chronic-disease management. Physical activity was suggested to improve cellular insulin reception, even though most patients tend not to adhere to a physical activity regimen (Dutton et al., 2009). Their investigation alluded to a one-unit increment change in self-efficacy with 12.67 minutes of physical activity per week to improve health to a considerable degree.

A cross-sectional and longitudinal analysis conducted by Plotnikoff et al. (2010), supported low participation in physical-activity with poor self-efficacy in physical activity. They suggested that only 36% of patients with DMT1 and 28% of DMT2 were engaged in physical activity that meets the moderate guideline of 150 minutes per week. Plotnikoff et al. (2010), alluded that the reason for the low individual engagement was rooted in difficulties in establishing an effective physical-activity programs that is easy to implement. Plotnikoff et al. (2003) conducted a separate study on populations of 46 and 1,556 diabetic and non-diabetic people to determine behavior on physical-activity and social-cognitive constructs. They noted that there was no difference in energy spent between diabetic and non-diabetic populations. Other problems that could hinder self-efficacy and diabetes management were cultural

influences. This was a formidable force in adhering to disease prevention and management. The qualitative study performed by McClosky and Flenniken (2010), on Southwestern New Mexico Hispanics population on dietary change program proved difficult. The participants were educated on diabetic diet regimen, however, during large family gatherings where traditional foods were in the menu, the regimen was ignored.

Other additional problems encountered in diabetes self-management were the denial aspect. Many in the study population do not believe they had the disease therefore did not follow the guidelines established by the research team of McClosky and Flenniken (2010). The team suggested in their findings that if self-efficacy were to work for these participants, foods valued by Hispanic cultures had to be included in the menu protocol. In addition, designing a self-efficacy intervention strategy, the designer should include appropriate cultural foods as part of behavior treatment, prevention, and management of diabetes and associated distress.

Study Research Design and Rationale

The purpose of this study was to assess the northern, the southern Nigerian diabetes distress, and their relationship with knowledge, culture, religion, and spirituality in the selected regions. I took into consideration the effect of covariates such as gender and education. The study method would ascertain the relationship between and among these variables using a quantitative research design format. The data collection involved the use of descriptive survey design and numerical measures using self-administered 57-item questionnaire as described in Appendix A: Nigerian Diabetes Distress Survey Evaluation Form.

The utilization of descriptive measures to answer questions and objectively view hypotheses through a prism of survey and observations were vital for testing the research hypotheses/theory and the obtainment of meaningful interpretations. According to Bebbie (2007) and Creswell (2009), a design should measure the study population size, distribution, and

association between the dependent and independent variables through descriptive correlational analysis. Creswell and Olson (1995) were of the opinion that a good study design captures theoretical hypothesis that unveils the relationship between exposures and health outcome concerned with disease prevalence in a population at a particular point in time. The convenient survey technique was used to address the stated research questions in Chapter 1. This technique is a nonrandom sampling measure that may not allow generalization. However, in this research study due to the usage of large sample size, generalization could be made.

Many other research methods such as qualitative or mixed method could substitute to address the research questions. However, unlike quantitative research that involves a larger group of populations, the qualitative research studies are concerned with small sections of a population and the researcher is vitually part of the research. Ulike the quantitative method, were researchers are external to the study population in order to experience the population reality (Olson, 1995). The time spent in cultivating relationships and trust with participants is longer in a qualitative research method. A mixed method use in this study would had had addressed the extent of the social problem in this community. The reason is that mixed method offers a cross examination of cognitive processes of quantitative positivism and qualitative constructivism (Krauss, 2005). If mixed method were used, it would have provided a more extensive theoretical paradigm. However, it would be more time consuming and costly. In regards to which method is best in a research study depends on the individual research study and researcher's preference. The respondent answers to the survey questions were relative to individual's information reality perception.

Whether objective information perception defined as inborn pattern of external reality accumulation or reality information perception defined as structural images such as pictures that are adapted as reality (Krauss, 2005), both could affect the way individuals answer research

questions associated with quantitative and qualitative questionnaires. According to Krauss, it is not certain if there is one knowledge-based reality or many realities where knowledge is learned. Reality could be a question of individual belief or perception.

The chosen locations for the study as stated earlier were on the bases of the differences in knowledge, religion, spirituality, and culture that could translate into differences in reality perception and diabetes distress, which would work well with convenient sampling technique. According to Trochim and Donnelly (2008), the primary interest of convenient and nonprobability sampling technique, is not to identify specific ideas but to gain a wide range of ideas on a disease such as diabetes and other associated variables. The primary interest of this sampling technique was to ascertain viewpoints of the population and not to represent the views proportionately. That was also the primary focus of this research as the research was designed to bring about view and to interpret those views, which are necessary for the advancement of any epidemiolocal study.

Methodology

The research methodology described the geographical locations involved in the samples collection, the study population, the study instrument, materials used in data collection, the study design, and rationale, sampling and sampling procedures, the study variables, data analysis, and statistical approaches used. The data that were used were collected ethically. The information obtained from respondents was not altered in any manner.

Study Population

The targeted populations in this study were adult male and female with diabetes living in northern and southern regions of Nigeria between the ages of 25 and 79 years. The southern participants for this study were selected from the teaching hospital in Lagos, Lagos state located

in the low plains of southern Nigeria. The selection of participants from the north, took place at the teaching hospital in Zaria, Kaduna state located in the high plains of the northern region of the country. The representations of respondents' in this study included male and female, varieties of ethnic groups, various religious and age groups, different marital status, varying degrees of educational attainments, and various cultural beliefs.

Sampling and Sampling Procedures

Research sampling involves the selection of participants unit from a larger group whom the research questions seek to obtain information. The method of contact included posting flyers in and around the two teaching hospitals' building by staffs. Potential participants in these hospitals were handed consent forms as described in Appendix B: Consent and Standard Instruction Notes. The pertaining to the research was also handed out to the participants. The flyers that appeared in Appendix I: Research Survey Flyer described the inclusion criteria for these participants. Individuals who completed the questionnaire were regarded to have the met criteria for inclusion.

The selected participants able to read, understand, and speak English were given consent forms and survey questionnaires to be completed by me. There was no need for translation from English to other languages and back to English because the participants selected were able to read, speak, and understand English. The study is scheduled to begin on June and end in July 2013. The contingency plan for missing helpers is a replacement them with other helpers trained to perform similar tasks while the contingency plan for insufficient amount of data is to extend the period of data collection to August 2013. However, that was not the case because enough data were collected within the prescribed time period. The recruitment and data collection started in June and ended in July 2013. The minimum desired sample size recruitment were met, therefore, I did not extend the duration beyond July 2013. The completed survey questionnaires

were deposited in a safe box near the research and the ethic departments of each hospital at the participants' own time.

In this study, I was interested to know the correlation between diabetes distress and other variables such as knowledge, religion, spirituality, and culture among the northern and the southern populations of Nigerian. The convenient sampling technique is a non-probability method, which allows easy access to population sample selection in part or in whole. In probability sampling, the values of odds between the two binary data and their relative risks are known to researchers, therefore could be generalized to the entire population unlike nonprobability technique, where the odds are unknown (Ioannidis et al., 2001; Trochim & Donnelly, 2008).

In any study, an effective sample size ensures a reasonable likelihood of detecting a difference if it really exists in the population. How large a sample size must be in order to detect a difference among population under study in the two hospitals was essential. I used power and sample size calculator software program (PS) version 3.0.43 to perform the sample size calculations. This program runs under the Microsoft Windows operating systems 2000 and beyond. Using PS software, I performed a regression on the subjects' values of y variable(s) against x variable(s). I determined that when the standard deviation of x variable is 0.41, the standard deviation of the regression errors is 0.4, and the true slope of the line obtained by regressing y variable against x variable is 0.25, that I needed 122 subjects from each hospital. Using the probability (power) of 0.8, I rejected the null hypothesis that the slope is equals. The Type I probability error associated with this test of null hypothesis is 0.05.

The approach to data analysis and bivariate comparisons included using Pearson correlation, t test, multiple regression, and MONAVA methods for independent means. The alpha level of the study set point was $p = .05$. However, due to the exploratory nature of this

study, findings significant at $p = .10$ level suggested a need for a future research study.

According to Murphy et al. (2009), provision for an acceptable sample size for any study should be on basis of selected parameters. The largest regression model in this study had four independent variables (knowledge, culture, religion, and spirituality). Based on Murphy et al. (2009 p. 202), when power = .80, α = .05, and a moderate estimated effect size (R_2 = .10), this study needed at least 122 participants from northern and southern teaching hospitals respectively as stated earlier. However, to account for the anticipated non-responses and incomplete survey questionnaire, I inflated this number by 10% to give an overall sample size of 134. There were very few non-responses and incomplete survey data in this research study

The Study Instrumentation and Materials

The instruments for the obtainment of the data were DKQ, HAKABPQ, and DDS. Permissions had been sort and granted for the use of these instruments. Many authors had used these instruments in both developed and global south countries (Fisher, 2009; Njie-Carr, 2009; Kolawole, Adeola, Adegbenro, Akintan, et al. 2008). The questions in these instruments applicable to this research study were adapted for use in the survey and demographic measurements. With author's permission in Appendix C, I replaced the HIV/AIDS in HAKABPQ questions with diabetes. The combined questionnaires including demographic, DKQ, HAKABPQ, and DDS would consists of five sections with 57 questions. The questionnaires would relate to demographic, diabetes distress, knowledge, spirituality, and culture. These self-report survey questionnaires were available to participants' in the two teaching hospitals. The anticipated confounders such as education and sex were also included in the demographic section.

Study Variables, Data Analysis, and Statistics

The primary reason for conducting this research study was to demonstrate that diabetes

distress is associated with independent variables such as knowledge, culture, religion,

spirituality, and the participant's regions of residence (Peterson, Homer, & Wonderlich, 1982).

The Chapter 2 literature review provided clues on how the independent variables affected the

attitude toward diabetes in the Hispanics and other communities (Bergland et al., 2007; Oomen

et al., 1999). If these associations were valid, one could then infer that the dependent variable

(diabetes distress) had a functional relationship with the independent variables knowledge,

spirituality, religion and culture. The information obtained from the respondents was analyzed

using t test, multiple regression, Pearson correlation, and MANOVA methods that would ensure

a reliable and valid result. I utilized SPSS software for data analysis to address the open and

closed ended descriptive questions. Using the odds ratio and the relative risk measurements, I

compared the likelihood of an event between diabetes distress and these other variables in

participants in the northern and the southern regions of Nigeria. This would permit unequivocally

the statement that the likelihood is not by chance alone. Below are the tables of variables and

data analysis format.

Table 1

Dependent and Data Type Used to Address Research Questions 1–3 in This Study

Variable	Variable type	Expected data type
Diabetes Distress	Dependent	Interval

Table 2

Independent and Data Type Used to Address Research Questions 1–3 in This Study.

Variable	Variable type	Expected data type
Culture	Independent	Ordinal
Religions	Independent	Ordinal
Knowledge	Independent	Nominal
spirituality	Independent	Ordinal

Table 3

Confounders and Data Type Used to Address Research Questions 1–3 in This Study.

Variable	Confounder Variables	Expected data type
Education	Confounder	Ordinal
Sex	Confounder	Nominal

Table 4

Data Analysis Chart

Research Question	Related Null Hypothesis	Scales/ Survey Items	Statistical Approach
1. Is there a difference in level of Diabetes distress in the two regions of residence in Nigeria?	There is a difference in level of diabetes distress in the two regions of residence in Nigeria.	Diabetes distress score and region.	*t* test
2. Is there a relationship between diabetes knowledge, spirituality, religion, and culture, as independent variables, and the diabetes	Diabetes knowledge, spirituality, religion, and culture, are not related to the diabetes distress score.	Knowledge score, spirituality score, religion score, culture score, diabetes distress score.	Multiple regression

distress score?

Sub-Question 2a: Is there a relationship between diabetes distress and knowledge? Sub-Question 2b: Is there a relationship between diabetes distress and cultural belief? Sub-Question 2c: Is there a relationship between diabetes distress and religious belief? Sub-Question 2d: Is there a relationship between diabetes distress and spiritual belief?	Knowledge is not related to diabetes distress score.	Knowledge score and diabetes distress score	Pearson correlation
	Cultural belief is not related to diabetes distress score.	Cultural belief score and diabetes distress score	Pearson correlation
	Religious belief is not related to diabetes distress score.	Religious belief score and diabetes distress score	Pearson correlation
	Spiritual belief is not related to diabetes distress score.	Spiritual belief score and diabetes distress score	Pearson correlation
3. Do differences exist between the two regions in Nigeria for the diabetes knowledge, spirituality, religion and culture scores?	No differences exist between the two regions in Nigeria for the diabetes knowledge, spirituality, religion, and culture scores?	Knowledge score, spirituality score, religion score, culture score, diabetes distress score and region.	One-Way MANOVA

Validity and Reliability Threats

According to Croswell (2009), quantitative research validity measures the effectiveness of an instrument in attaining a useful or meaningful assumption based on the scores. Reliability on the other hand, measures internal consistency of the scores across construct. To obtain a quality score across construct, the questionnaire administration to the participants in the two teaching hospitals located in the northern and the southern parts Nigeria were in friendly environments. The participants' received assistant/support in the areas that may be difficult to comprehension. In addition, the physical and psychological conducive nature of the study as described in the flyers, consent, and instruction forms minimized errors involved with collectors' bias. When necessary, the participants were offered chairs in a quiet area of the hospitals for comfort and without disturbance.

The questions and consent forms were given to the participants' individually with clear instructions. I collected as much information as possible from the participants. Those who refused or did not complete the entire questions were placed into consideration during data analysis for external validity threats purposes.

Even though the use of convenience sampling technique may exclude individual that met the criteria for inclusion, and therefore may compromise generalization due to biases involved in the sample selections, it is still the most appropriate method for this type of research (Bello & Umar, 2011). I am pleased that it was not the case in this study. Convenience sampling technique could create inherent bias that may skew the research viewpoint and therefore, may not measure accurately what the research is intended to measure. The usage of nonrandom selection process in form of convenience technique, could compromise generalization as mentioned earlier due to inadequate representation of

population. However, where correlations were established, a follow-up study using randomized technique would aid in generalization were suggested. This would annual the effect of the use of convenient sampling technique because the result would then become easier for generalization.

Ethical Considerations

In conducting a research, honesty and integrity is as much a part of a good research as due diligence and expertise. I obtained informed consent and participants' were briefed on the research purpose and their role in the study as described in Appendix B: Consent and standard instruction form. The research maintained the anonymity of the subjects and did not use participants' names or hospital identification numbers. The study executed confidentiality by avoiding releasing participants' information to any third party. The protection of participants' information through computer access code and password were vital to this study.

The subjects' participation was voluntary. The participants obtained and answered structured questionnaire at the two teaching hospitals. The ethical principles and guidelines articulated in Belmont report were the guiding principle in this research. These principles and guidelines articulated in the report included first, respect of human subjects second, conducting a research to benefit and not to harm subjects, and last, uphold moral/lawful righteousness during a behavioral or biomedical research studies. As mentioned earlier, participation was on a voluntary basis. However, if a participant decides at any point that he or she no longer willing to participate, he or she was free to withdraw at any time.

I am familiar with human subject protection laws and entities in Nigeria that could have impact in this research study. The two teaching hospitals also have research and ethics department that gave approval to conduct this research in their facilities. They also monitored

closely to make sure there are no risks involved to the participants. At the time this study was completed, one to two page summaries were made available to the two major Newspapers in Nigeria: the Daily Times and Punch. Additionally, the two teaching hospitals and other hospitals were given a copy of the Summary. Beyond that, a copy of the publication was sent to Diabetes Association of Nigeria (DAN).

Data Collection

The coherent and organized collection of data from diabetes distress patients necessary for this study that would assist in designing, implementing, and evaluating public health prevention programs started after an official approval from the IRB and the community research partners. The collection began by handing out flyers to potential participants as well as posting the flyers in and around the hospital buildings in the participating areas. The participants were given survey questions to complete and return at their own time in a locked drop box. The clues to the research questions posed earlier in Chapter 1 were obtained by this survey data as detailed in the data analysis, research questions and hypotheses; result and interpretation sections below. The periods for the data collection from diabetes patients visiting the 2 hospitals were between the ages of 25-79 years at South (LUTH) and North (ABUTH) and were conducted between the months of June and July 2013.The respondents' rate was great with a little non-responses and incomplete data. The participants were eager to assist by completing the questionnaires that were provided to them. The analysis did not take into account of what could be inferred from missing informative values as missing and incomplete data were few. There were no discrepancies from actual data collection and proposed method in Chapter 3.

Recruitment

Participants recruited for this study were diabetes patients seeking services at LUTH and ABUTH between the ages of 25-79 years old. Individuals who completed the questionnaire were

regarded as meeting the criteria. The screening procedure used for exclusion was potential

participants that able to read and understand consent forms and flyers. If they were unable to

speak, read, and understand the consent form and flyers, they were excluded. However, if they

are able to speak, read, and understand the content forms and flyers, they were included. It is

important to note that majority of individuals that lives in the big cities like Lagos and Zaria

speaks English and were fluent enough to take the survey.

Data Analysis

The purpose of this study was to explore whether a relationship existed between diabetes

distress and knowledge, culture, stated religion and religious/spiritual beliefs that could add to

QoL in adult men and women (ages 25–79 years) who live in northern and southern regions of

Nigeria. Data from 268 respondents from these regions were used for the study.

Descriptive and Demographic Characteristics

In order to explore fully the descriptive and demographic characteristics, the distribution,

and variability of location, gender, religion, age range, marital status, education, and ethnicity

have to be described. Table 5 below assisted with describing and drawing inferences regarding

characteristics of the entire diabetes distress population in Nigeria. These basic statistical

characteristics would be extended into area of univariate, bivariate and multivariate statistical

analysis as described in various tables below.

Table 5

Descriptive and Demographic characteristics report: Frequency Counts for Selected Variables
(N = 268)

Variable	Category	*n*	%
Location			
	South	134	50.0
	North	134	50.0
Gender			
	Male	141	52.6
	Female	127	47.4
Religion			
	Muslim	128	47.8
	Christian	125	46.6
	Other	15	5.6
Age Range [a]			
	24 to 29 years	13	4.9
	30 to 39 years	32	11.9
	40 to 49 years	63	23.5
	50 to 59 years	64	23.9
	60 to 69 years	63	23.5
	70 to 79 years	33	12.3

Marital Status			
	Now married	148	55.2
	Widowed	53	19.8
	Divorced	22	8.2
	Separated	21	7.8
	Never married	24	9.0
Education			
	Less than high school graduate	52	19.4
	High school graduate	26	9.7
	Some college	75	28.0
	Bachelor's degree	51	19.0
	Graduate degree	64	23.9
Ethnicity			
	Hausa/Fulani	123	45.9
	Ibo	49	18.3
	Yoruba	76	28.4
	Other	20	7.5

[a] Age: $M = 53.59$, $SD = 13.89$.

Table 5 displays the frequency counts for selected variables. Equal numbers of respondents who lived in northern and southern parts of Nigeria were used. There were male (52.6%) than female (47.4%) respondents in the sample. Most respondents were either Muslim

(47.8%) or Christian (46.6%). Ages of the respondents ranged from 25 to 79 years ($M = 53.59$,

$SD = 13.89$). Over half of the respondents (55.2%) were now married and the next largest

category (19.8%) was widowed. Seventy-one percent of the respondents had completed at least

some college and 23.9% of the sample had completed graduate degrees. The most common

ethnic groups were either "Hausa/Fulani (45.9%)", "Yoruba (28.4%)" or Ibo (18.3%) (Table 5).

Religion and Ethnicity Based on Location

Nigeria has diverse religious and ethnic groups as described in table 6 below. The two

major religious groups in Nigeria are Muslims and Christians. The Ibo and Yoruba are mostly

Christians while the Housa/Fulani are Mostly Muslims. In this study, the House/Fulani, the

Yoruba, and the Ibo accounted for 85.1% of the study population.

Table 6

Chi-Square Tests for Stated Religion and Ethnicity with Location (N = 268)

Variable	Category	South		North	
		n	%	*n*	%
Stated Religion [a]					
	Muslim	18	13.4	110	82.1
	Christian	104	77.6	21	15.7
	Other	12	9.0	3	2.2
Ethnicity [b]					
	Hausa/Fulani	21	15.7	102	76.1
	Ibo	37	27.6	12	9.0
	Yoruba	62	46.3	14	10.4

Other	14	10.4	6	4.5

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[a] $\chi^2(2, N = 268) = 126.64$, $p = .001$. Cramer's $V = .69$.
[b] $\chi^2(3, N = 268) = 99.61$, $p = .001$. Cramer's $V = .61$.

Table 6 displays the results of the chi-square tests for stated religion and ethnicity with geographic location. Both tests were significant at the $p <.001$ level. Inspection of the table found southern Nigerians to be mostly Christian (77.6%) and had an ethnic background of either Yoruba (46.3%) or Ibo (27.6%). However, northern Nigerians were mostly Muslim (82.1%) and from the Hausa/Fulani ethnic group (76.1%) (Table 6).

Psychometric Tests of Independent Variables

A multiple linear regression was performed to detect independent variables associated with psychometric test score. This test was designed and implemented to measure the precision of the measuring instrument used. The reliability associated with psychometric test score was used to interpret data and predict the value of scores and in some cases the relationship among variables; as described in table 7 below.

Table 7

Psychometric Characteristics for the Summated Scale Scores (N = 268)

Scale	Number of Items	M	SD	Low	High	α
Diabetes Distress Screening Scale	17	3.97	0.87	1.12	5.18	.89
Cultural Beliefs Subscale	9	3.10	0.49	2.00	4.00	.68

Religious/Spiritual Beliefs Subscale	12	3.37	0.41	1.92	4.00	.72
Diabetes Knowledge Total Score	12	6.37	1.91	0.00	10.00	.57

Table 7 displays the psychometric characteristics for the four summated scale scores. For three of the scores (diabetes distress, cultural beliefs, and religious/spiritual beliefs), acceptable levels of internal reliability were observed (Trochim, & Donnelly, 2008). The diabetes knowledge total score had a Cronbach alpha reliability coefficient of $\alpha = .57$ which is generally considered to be too low. However, this level of internal reliability was not surprising considering that the total knowledge scale measured the respondent's knowledge across several diverse topics, which would naturally lower the internal consistency of the responses (Table 7).

Research Questions and Hypothesis: Results and Interpretations

Research Question 1 asked, "Is there a difference in level of diabetes distress in the two regions of residence in Nigeria?" and the related null hypothesis predicted that, "Ho: There is no difference in level of diabetes distress in the two regions of residence in Nigeria." To address this question, Table 8 displays the results of the *t* test for independent means comparing the two regions of residence for the respondent's diabetes distress screening score. This difference was not significant ($p = .16$) which provided support to retain the null hypothesis.

Table 8

t *Test Comparisons for Selected Variables Based on Location (*N *= 268)*

Variable	Location	n	M	SD	r_{pb}	t	p

Variable				r_{pb}	t	p
Diabetes Knowledge Total Score				.02	0.32	.75
	South	134	6.34	2.07		
	North	134	6.41	1.75		
Diabetes Distress Screening Scale				.09	1.42	.16
	South	134	3.90	0.94		
	North	134	4.05	0.78		
Cultural Beliefs Subscale				.12	1.99	.05
	South	134	3.16	0.52		
	North	134	3.04	0.46		
Religious/Spiritual Beliefs Subscale				.08	1.28	.20
	South	134	3.40	0.48		
	North	134	3.34	0.31		

r_{pb} = Point-biserial correlation.

Table 8 above also displays the *t* tests results for diabetes total knowledge ($p = .75$), cultural beliefs ($p = .05$), and religious/spiritual beliefs ($p = .20$). Inspection of the table found southern Nigerians to have significantly higher cultural beliefs scores than did northern Nigerians ($M = 3.16$ versus $M = 3.04$) (Table 8).

Table 9

Prediction of the Diabetes Distress Score Based on Selected Variables (N = 268)

Variable	B	SE	β	p

Intercept	1.43	0.48		.003
Diabetes Knowledge Total Score	0.13	0.03	.28	.001
Muslim [a]	-0.04	0.21	-.02	.84
Christian [a]	-0.29	0.21	-.17	.18
Cultural Beliefs Subscale	0.56	0.10	.32	.001
Religious /Spiritual Beliefs Subscale	0.04	0.13	.02	.73

Full Model: F (5, 262) = 14.89, p = .001. R^2 = .221.
[a] Dummy Coding: 0 = *No* 1 = *Yes*.

Table 9 is the Prediction of the Diabetes Distress Score based on selected variables. Standardized beta weights were used to compare the strength of prediction across variables. Larger standardized beta weights of .28 and .32, corresponding to Diabetes Knowledge Total Score and Cultural Beliefs Subscale (table 9) were considered stronger predictors of diabetes distress and it includes the selected variables in Sub-Questions 2a, 2b, 2c, and 2d. Research SubQuestion 2a asked, "Is there a relationship between diabetes distress and knowledge?" and the related null hypothesis predicted that, "H$_0$: knowledge has no relationship to diabetes distress score." This question was answered using a Pearson product-moment correlation (Table 10). There was a significant positive correlation between the two constructs (r = .33, p <.001) which provided support to reject the null hypothesis.

Table 10

Inter-Correlations among the Summated Scale Scores (N = 268)

Scale	1	2	3	4

1. Diabetes Knowledge Total Score	1.00							
2. Diabetes Distress Screening Scale	.33	****	1.00					
3. Cultural Beliefs Subscale	.18	***	.36	****	1.00			
4. Religious / Spiritual Beliefs Subscale	.34	****	.15	**	.20	****	1.00

*$p < .05$. ** $p < .01$. *** $p < .005$. **** $p < .001$.

Table 10

Inter-Correlations among the Summated Scale Scores (N = 268)

Scale	1	2	3	4

85

1. Diabetes Knowledge Total Score	1.00						
2. Diabetes Distress Screening Scale	.33	****	1.00				
3. Cultural Beliefs Subscale	.18	***	.36	****	1.00		
4. Religious / Spiritual Beliefs Subscale	.34	****	.15	**	.20	****	1.00

*$p < .05$. ** $p < .01$. *** $p < .005$. **** $p < .001$.

Research SubQuestion 2b asked, "Is there a relationship between diabetes distress and cultural belief?" and the related null hypothesis predicted that, "Ho: Cultural belief has no relationship to diabetes distress score." This question was answered using a Pearson productmoment correlation (Table 10). There was a significant positive correlation between the two constructs ($r = .36$, $p < .001$) which provided support to reject the null hypothesis.

Research SubQuestion 2c asked, "Is there a relationship between diabetes distress and stated religion?" and the related null hypothesis predicted that, "Ho: Stated religion has no relationship to diabetes distress score." This question was answered using Pearson product-moment correlations (Table 11). No significant correlations were found between diabetes distress and either being Muslim ($r = .08$, $p > .05$) or being Christian ($r = -.08$, $p > .05$). This combination of findings provided support to retain the null hypothesis.

Table 11

Pearson Product-Moment Correlations for Selected Variables with the Primary Scale Scores

(N = 268)

Religious/Variable	Knowledge	Distress	Culture	Spiritual

Gender [a]	.02		-.01		.13	*	.12	
Muslim [b]	-.05		.08		-.08		-.15	*
Christian [b]	.09		-.08		.13	*	.18	***
Married [b]	-.11		-.07		.00		-.02	
Education	.49	****	.50	****	.35	****	.34	****
Location [c]	.02		.09		-.12	*	-.08	
Age	.08		.19	***	.18	***	.11	

*$p < .05$. ** $p < .01$. *** $p < .005$. **** $p < .001$.
[a] Gender: 1 = *Male* 2 = *Female*.
[b] Dummy Coding: 0 = *No* 1 = *Yes*.
[c] Location: 1 = *South* 2 = *North*.

Research SubQuestion 2d asked, "Is there a relationship between diabetes distress and religious/spiritual beliefs?" and the related null hypothesis predicted that, "Ho: Religious/spiritual beliefs have no relationship to diabetes distress score." This question was answered using a Pearson product-moment correlation (Table 6). There was a significant positive correlation between the two constructs ($r = .20$, $p < .001$) which provided support to reject the null hypothesis.

Research Question 3 asked, "How well are these two regions in Nigeria represented by the subscales of diabetes knowledge, religious/spiritual beliefs, stated religion, and culture?" and the related null hypothesis predicted that, "Ho: The two regions in Nigeria are not well represented by the subscales of diabetes knowledge, religious/spiritual beliefs, stated religion, and culture?." To answer this question, a one-way MANOVA test was calculated comparing the

two regions of Nigeria with the selected variables. The overall Wilks' Lambda statistic was significant ($p = .001$). As a step down analysis, t tests for independent means were calculated (Table 8). As stated previously, southern Nigerians had significantly higher cultural beliefs scores ($p = .05$) but no differences were found between the two geographic groups for knowledge ($p = .75$), diabetes distress ($p = .16$), and religious/spiritual beliefs ($p = .20$) (Table 8). In addition, southern Nigerians were significantly more likely to be Christians (77.6%) while northern Nigerians were more likely to be Muslim (82.1%) (Table 6). This combination of findings provided support to reject the null hypothesis.

Sample Representation to overall Population

As stated earlier, in any study an effective sample size ensures a reasonable likelihood of detecting a difference if it really exists as well as representation to the larger population. Therefore, 268-sample size was large enough to detect differences among population under study in the two areas. In this survey study, the representativeness of the sample to the larger population was accurate. Based on the 2008 Nigerian census by the National Population Commission [NPC] and ICF Macro, 2009 and U.S. central intelligence agency, the larger population ratio of men to women in millions is 1.01 to 1 (National Population Commission [NPC] and ICF Macro, 2009 and CIA, n.d.) compared to 52.6% of men to 47.4% of female in this survey (table 5). The U.S. central intelligence agency (n.d.) also noted that Muslims populations were 50% while Christians accounted for 40% of the population and indigenous beliefs 10% (CIA, n.d.) similar to the survey that measured Muslims at 47.8%, Christians 46.6% and others at 5.6% (table 5). Additionally, the National Population Commission [NPC] and ICF Macro, 2009 census also recorded 25.2% of women and 47.4% of men 25 years and older as never married, 69.1% of women and 49.0% of men to be married, 1.9% of women and 1.3% of

men as divorced/separated and 2.3% of women and 0.4% men as widowed (National Population Commission [NPC] and ICF Macro, 2009) compared to this survey on marital status on table 5. The National Population Commission [NPC] and ICF Macro, 2009 census had 63.7% of 25 years and older as having completed more than secondary school (equivalent to more than high school in America). However, the survey (table 5) had 70.9% to have completed more than secondary school. The reason why the measure for education in this survey is higher than the census data could be because of participants' inflating their education or that the participants were actually that educated since the study was designed for participants who can read and understand English. The U.S. central intelligence agency (n.d.) also reported the percentages of the three major ethnic groups as 29% (Housa/Fulani), 21% (Yoruba) and 18% (Ibo) similar to the results of 45.9% for Housa/Fulani, 28.4% for Yoruba and 18.3% for the Ibo obtained from this survey (table 5). The similarities of these results implies the survey results of 268 diabetes participants, was proportional to the true population value. However, the true population value may be slightly higher or lower in some cases. The exploratory nature of this study, suggests any findings significant at $p = .10$ levels should be further investigated.

Interpretation of the Demographic Findings

The purpose of this study was to explore whether a relationship existed between diabetes distress and knowledge, culture, stated religion and religious/spiritual beliefs between the respondents from the northern and the southern regions. It was noted that an approximate numbers of respondents lived in northern and southern regions of Nigeria. However, there were slightly more male (52.6%) than female (47.4%) respondents in the sample and the ratio of Muslim to Christian was 1.026 to 1.00. The most common ethnic groups were Housa/Fulani (45.7%), Yourba (28.4%), and Ibo (18.3)%. The youngest among the participants was 25 years

old and the oldest was 88 years. The mean age was 53.59 and the standard deviation was 13.89. All results were close to expectations based on 2008 national census survey and the U.S. central intelligence report. However, the number of respondent married (55.2%) was a little higher than expected. The number of respondents that were widow was expected. Nigeria is a part of African nations that have a high rate of HIV/AIDS and other communicable diseases. Perhaps that could have contributed to the high number of widows (19.8%). The surprising finding was the high number of respondents (71%) that were educated beyond secondary school or high school. This could be because of respondents' inflating their ages or could be that the respondents were really that educated since the research was designed for participants who could read and understand English.

Interpretation of Diabetes Distress, Knowledge, Cultural, and Spiritual/Religious Beliefs Findings.

Patients' knowledge or the lake of knowledge in diabetes disease could enhance or compromise medical treatments, medication adherence, and even HSB, which are essential in reducing diabetes distress and improving health outcome. Culture is a social construct guided by behavior and attitudes that represents the view of an individual or social group and the world around them (Naeem, 2003). This may include other people's cultures, daily events, supernatural forces, and diseases. Spiritual and religious beliefs particularly among people with strong cultural and ethnic affiliations could constitute a problem in diabetes distress management. To know what extend the aforementioned significant contribution is essential in distress management. In this study, some of the findings of the independent variables (knowledge, culture, religion, and spirituality) supported positive correlation while others supported negative correlation with the dependent variable (diabetes distress).

The chi-square test was used for the stated religion and ethnicity with geographic

location. Both tests were significant at the p <.001 level. This means there is 0.1% chance that

the deviation is due to chance alone. It also means that some factor beyond chance is involved in

the deviation. The psychometric characteristics for the four summated scale scores were used to

measure errors. Psychometric scale scores are in most cases used to facilitate acceptability

internal reliability. The scale scores for diabetes distress, cultural beliefs, and religious/spiritual

beliefs in this study, attained acceptable levels of internal reliability (Trochim & Donnelly,

2008). However, the diabetes knowledge total score had a Cronbach alpha reliability coefficient

(coefficient of internal consistency) of α = .57 was considered too low in this study. This low

level of internal reliability consistency was not surprising considering that the total knowledge

scale measured the respondent's knowledge across several diverse topics, which would naturally

lower the internal consistency of the responses.

The independent means comparison of the two regions of residence for the respondent's

diabetes distress screening score, revealed a (p = .16) score which provided support for the null

hypothesis. The t tests results for diabetes knowledge (p = .75), cultural beliefs (p = .05), and

religious/spiritual beliefs (p = .20), suggested significantly higher cultural beliefs scores in the

south than in the north (M = 3.16 versus M = 3.04). The multiple regression model using diabetes

distress as the dependent variable was significant (p = .001) and accounted for 22.1% of the

variance in diabetes distress. The diabetes distress was found to be higher for those with more

knowledge about diabetes (β = .28, p = .001) and for those with higher cultural belief scores (β =

.32, p = .001). There was a significant positive correlation between diabetes distress and

knowledge. The two constructs had (r = .33, p <.001). In addition, there were also a significant

positive correlation between diabetes distress and cultural belief; the two constructs had (r = .36,

p <.001). Diabetes distress and stated religion unlike knowledge and culture had no significant correlations. The Muslim report was (r = .08, p >.05) and Christian was (r = -.08, p >.05). Even though knowledge and cultural belief had relationships to diabetes distress; religion had no relationship to diabetes distress. However, diabetes distress and religious/spiritual beliefs had positive significant correlation between them (r = .20, p <.001).

The one-way MANOVA test was used to calculated the comparison between the two regions in Nigeria with the selected variables. The overall Wilks' Lambda statistic (used to test the differences between the means of identified groups of respondents on dependent variable) was significant p = .001. However, a stepped down t tests analysis for independent means indicated that the southern Nigerians had significantly higher cultural beliefs scores (p = .05) but no differences were found between the two geographic groups for knowledge (p = .75), diabetes distress (p = .16), and religious/spiritual beliefs (p = .20). Southern Nigerians were significantly more likely to be Christians (77.6%) while the north were more likely to be Muslim (82.1%) which were expected.

Summary

In summary, this study explored whether a relationship existed between diabetes distress and knowledge, culture, stated religion and religious/spiritual beliefs that could add to QoL in adult men and women (ages 25–79 years) who live in northern and southern regions of Nigeria based on the survey answers from 268 respondents. Research Question 1 (diabetes distress with geographic region) found no differences between the groups (Table 8). The result of Research Question 2 (diabetes knowledge, culture, stated religion, and religious/spiritual beliefs, with diabetes distress) was found to have significant relationship (Table 9). Diabetes knowledge and religious/spiritual beliefs were related to diabetes distress. In the final chapter, these findings will

be compared to the literature, conclusions and implications will be drawn, and a series of recommendations will be suggested

Diabetes does not only affect those individuals suffering with the disease, it also affects communities and countries through disease burden. According to Wang et al. (2009), the global estimate for diabetes cost is $241 billion or more for individuals between the ages of 20 and 79. This cost is largely avoidable if we understand diabetes distress and the presumed contributors (knowledge, cultural, religious, and spiritual beliefs). The estimated cost for prediabetes, undiagnosed, gestational diabetes, DMT1, DMT2 and juvenile, in the United States was $218 billion annually (ADA, 2011a). DMT2 is the most prevalent form of diabetes: accounting for 90% of all diabetes cases as noted by WHO (2010).

Understanding diabetes distress contributors is essential to living a better QoL. King, Aubert, and Herman (1998), reported that developed countries estimates of population with diabetes would increase by 11% from 1995 to 2025, equivalent to 1 billion people. The global south on the other hand, will increase by 80%, equivalent to a range between 2.5 and 4 billion people. King et al. (1998) estimated that from 1995 to 2025, there might be an increase of 60% equivalent to 3-5 billion people worldwide. In view of this expected increases, it is important to address the issues relating to diabetes distress, particularly in global south including Nigeria with hope that it may affect how individuals and the communities view the disease and its related stress. The literature review to follow in chapter 2 elaborated on diabetes and other associated variables. The discussion included diabetes distress in Nigeria as it relates to people's knowledge, culture, spirituality, and religion.

Even though studies involving extensive literature investigation and research studies on the subject of diabetes has taken place, none to my knowledge addressed the combination of these variables that included religious beliefs, spiritual beliefs, cultural beliefs, and the peoples'

knowledge relating to diabetes distress in the northern and southern regions of Nigeria. This literature review detailed studies on diabetes and associated distress, specifically DMT2, which afflict members of older populations ranging from 25 to 79 years old. As mentioned in Chapter 1, vast numbers of the Nigerian population were under the age of 24 years in 2005. As the younger population ages, DMT2 is expected to rise and may be diabetes distress.

Additionally, this review provided information on the accomplishments in diabetes research studies and other related factors that include reports on global prevalence, and psychological stress. DMT2 requires self-management that does not work well with individuals/countries limited in diabetes-management funds that could provide education on cultural, spiritual, and religious influence to improve knowledge and QoL. One of the remedies necessary to correct diabetes distress is with education and knowledge on DMT2 management that could lead to better QoL.

Diabetes risk factors are genetic inheritance and environmental risks. The genetic risk factor involves passing genes from parents to offspring, predisposing them to overweight/obesity and diabetes disease. Environmental factors, in contrast, involve the individual's knowledge, culture, spirituality, religion, and psychological behavior toward health. This study enhanced the knowledge of the factors affecting diabetes distress, aided in the management of diabetes and its complications, and in turn could reduce the complications of both long- and short-term risk as well as diabetes distress.

The burden on individuals and societies would also be reduced, achievable through appropriate self-efficacy and management guidelines. Even though twin studies have been shown to influence the study of diabetes through hereditary traits, knowing how to self-manage psychological stress associated with this disease could improve QoL of DMT2 sufferers. The twin studies of elderly monozygotic (MZ) twins have shown a remarkable prevalence of DMT2 compared with dizygotic (DZ) twins (Malecki, 2005 & Poulsen et al., 2009). The identification and isolation of nine genetic loci including CDKAL1 associated with DMT2 patients in West Africa, and HapA among different populations worldwide including the Yoruba people of southern Nigeria are reasons for concern.

Chapter 3 to follow detailed the methodology on how the study variables identifications, data collections, and threats associated with internal and external validity took place. The extermination of the reliability associated with this study, the statistical analysis of the data, and the assumptions, and potential threats associated with the methodology took place in chapter

The intention of this research study is to assess whether relationships exist between diabetes distress and other independent variables in northern and southern regions of Nigeria. The design for the study is a quantitative design. This quantitative descriptive study measured dependent and independent variables using convenient method. The study provided a "snapshot" of relationships and trend of the distress associated with the diabetes in these two regions between the months of June and July 2013. The research used survey questionnaires from DDS, DKQ, and HAKABPQ to collect data. The data analysis solicited the use of Pearson correlation, t-test, multiple regression, and MONAVA methods. The chapter that followed (chapter 4) enumerated the analysis and elucidated the final analysis report of the study using SPSS software. In addition, the chapter provided a detailed test of the hypothesis and research questions analysis of the study variables and data obtained scores.

Recommendations

In this study, some unanswered questions have been addressed. The connections and lack of relationships between diabetes distress and knowledge, cultural, religious and spiritual beliefs had been brought to light. It was found that diabetes knowledge and religious/spiritual beliefs were related to diabetes distress. Knowledge and religious/spiritual beliefs should be considered when writing and implementing programs for diabetes distress. It is reasonable to infer that including more Muslims in the south and more Christians in north would result in a clearer regional correlation. Future researches on diabetes distress should include the severity of the disease, current health status of loved ones, patients' relationship with their doctors, and whether

or not the respondents have health insurance coverage. The role of emotional support from family members, self-efficacy of patients, and other social elements should also be considered when developing diabetes distress strategies. The findings in this study should be used in clinical practice, designing educational strategies, and in developing and implementing programs to reduce diabetes distress associated with type 2 diabetes.

Conclusion

Diabetes does not only affect those individuals suffering with the disease, it also affects communities and countries through disease burden. According to Wang et al. (2009), the global estimate for diabetes cost is $241 billion or more for individuals between the ages of 20 and 79. This cost is largely avoidable if we understand diabetes distress and the presumed contributors (knowledge, cultural, religious, and spiritual beliefs). The estimated cost for prediabetes, undiagnosed, gestational diabetes, DMT1, DMT2 and juvenile, in the United States was $218 billion annually (ADA, 2011a). DMT2 is the most prevalent form of diabetes: accounting for 90% of all diabetes cases as noted by WHO (2010).

Understanding diabetes distress contributors is essential to living a better QoL. King, Aubert, and Herman (1998), reported that developed countries estimates of population with diabetes would increase by 11% from 1995 to 2025, equivalent to 1 billion people. The global south on the other hand, will increase by 80%, equivalent to a range between 2.5 and 4 billion people. King et al. (1998) estimated that from 1995 to 2025, there might be an increase of 60% equivalent to 3-5 billion people worldwide. In view of this expected increases, it is important to address the issues relating to diabetes distress, particularly in global south including Nigeria with hope that it may affect how individuals and the communities view the disease and its related stress. The literature review to follow in chapter 2 elaborated on diabetes and other associated variables. The discussion included diabetes distress in Nigeria as it relates to people's

knowledge, culture, spirituality, and religion.

In spite of all these positive influences, religion could also have a negative impact on health when used to legitimize intolerance, aggression, and even hatred (Williams &Sternthal, 2007). A meta-analysis of 49 studies of religious impact on health suggested depression, anxiety, and distress to be associated with positive coping mechanisms, whereas poor mental adjustment was associated with negative coping abilities (Williams &Sternthal, 2007). The qualitative research study on religion conducted by Bergland, Heuer, and Lausch (2007) on Hispanic migrant farm workers in the United States with DMT2 supported the argument that prayer is an important coping mechanism for many cultures. The authors asked participants the following questions to ascertain information on the importance of religion and prayer. The first question was whether religion has any effect on their health. The second question was the use of prayer and its connection to general health, specifically to diabetes. In their findings, they ascertained that the effect of prayers by participants, positively affected how they feel physically and mentally. It was noted to affect quality of life and willingness to receive treatment that is vital to the self-management of diabetes and its associated distress.

Individuals or populations associated with religion are likely to have a positive behavior change toward health and a positive health outcome, as mentioned earlier (Leininger & McFarland, 2002; Rew& Wong, 2006). Some individuals suffering from diabetes, including the Muslims that comprise half the Nigerian religious population, commemorate their religion by fasting during the 9th month of the Islamic calendar, called Ramadan (Benaji et al., 2006). The fasting includes abstinence from foods and liquid from sunrise to sunset. During this period, Muslims who are suffering from diabetes could experience problems in controlling their blood glucose. However, the religion exempts these individuals from fasting. The participants in many

cases do not heed to the advice to abstain from foods and liquids as revealed in a survey involving multi-centric populations of Muslims. The study suggested 78.7% of those with DMT2 and 42.8% of those with DMT1 to have participated in the fasting and abstained from foods and liquids (Benaji et al., 2006).

The aim of the study was to explore whether a relationship exists between diabetes distress and knowledge, culture, religion and spirituality that could add to QoL in adult men and women (ages 25–79 years) who live in northern and southern regions of Nigeria. In this chapter, findings and interpretation would be compared to the literature, conclusions and implications will be drawn, and a series of recommendations would be suggested. Research Question 1, was created to provide insight on how the two regions under study measured with diabetes distress. It was determined that the difference was not significant ($p = 0.16$) which supported the null hypothesis that there is no difference in the level of diabetes distress between the two regions. However, the southern Nigerians have significantly higher cultural beliefs scores than the northern Nigerians ($M = 3.16$ versus $M = 3.04$). Research Question 2 investigated the relationship between diabetes knowledge, culture, religion, and spirituality, and the diabetes distress score. The result of the overall model was significant ($p = 0.001$) and accounted for 22.1% of the variance in diabetes distress. It is significant to note that distress was higher for those with more knowledge about diabetes ($\beta = 0.28$, $p = 0.001$) and those with higher cultural belief scores ($\beta = 0.32$, $p = 0.001$). Subquestion 2a, had a significant positive correlation between the two constructs ($r = 0.33$, $p < 0.001$), SubQuestion 2b, had positive correlation between the two constructs ($r = 0.36$, $p < 0.001$), and SubQuestion 2d, also had a significant positive correlation between the two constructs ($r = 0.20$, $p < .001$) which provided

support for the rejection of the null hypothesis in all three SubQuestion. However, SubQuestion

2c, had no significant correlations between diabetes distress and either being Muslim ($r = 0.08$, $p > 0.05$) or being Christian ($r = -0.08$, $p > 0.05$), which provided support to retain the null hypothesis. Research Question 3, was created to provide insight on how well the two regions are represented by the subscales of diabetes knowledge, culture, religion, and spirituality. It was determined that the southern part of the country had significantly higher cultural beliefs scores ($p = 0.05$) but no differences were found between the two geographic groups for knowledge ($p = 0.75$), diabetes distress ($p = 0.16$), and religious/spiritual beliefs ($p = 0.20$). Bandura's (2004) social cognitive theory was the bases for this study. It inferred that learning occurs in a social framework and that the majority of learned behavior was mostly through cognitive means. The proposed conceptual framework attempted to connect diabetes distress with other social elements. These theoretical foundations and conceptual framework are the bases for this research approach, the research questions, and the hypotheses. The summary in this study incorporated these constructs into the study review. Bandura's (2004) idea of health promotion and disease prevention/management by social-cognitive means recognized psychosocial factors to be the determinant of how well a life is lived with good measure of self-efficacy or with disease/debility, complication, and burden. Self-efficacy is an important tool in improving QoL, fighting against occurrence, and the management of diabetes. In this study the culture have more significant influence than religion/spiritual belief. The result ($p=0.05$) of a psychosocial factor such as culture, supported Bandura's ideas of learned behavior through social cognitive means.

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