Living with Sugar: Socioeconomic Status and Cultural Beliefs About Type 2 Diabetes Among Afro-Caribbean Women

by

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Dedication

In loving memory of my mother, Maureen Smith who inspired me to embark on this academic journey. This dissertation also would not be possible without the loving and unwavering support of my godmother, Zita St. John as well as my friends, Collette Brown, Laura DiDio and Teresa Leslie.
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Living with Sugar: Socioeconomic Status and Cultural Beliefs About Type 2 Diabetes Among Afro-Caribbean Women

Chrystal A.S. Smith

ABSTRACT

In the U.S., individuals of Afro-Caribbean and Latino descent are two to three times more likely to develop type 2 diabetes than non-Hispanic whites. Caribbean and Latin America migrants, particularly minority women bear a disproportionate burden of type 2 diabetes and its risk factors. The purpose of this research is to investigate if Afro-Caribbean women share a cultural belief model about type 2 diabetes and how this belief model, along with structural barriers to health care, influence disease risk and management.

A sample of 40 women, primarily Jamaican and Trinidadian, 35 to 90 years of age previously diagnosed with type 2 diabetes were recruited in southwest Florida. Sociodemographic, medical history, and self-reported height and weight data were collected from women. A 53 item yes/no cultural beliefs questionnaire about type 2 diabetes’ etiology, treatment, and symptoms was administered to 30 women. Semi-structured interviews about diet and lifestyle type 2 diabetes management were conducted with 38 women, 24 interviews were conducted over the telephone.
The cultural consensus analysis used to analyze the cultural beliefs questionnaire found that the women shared a single cultural belief model (.72 ±.081 SD) about type 2 diabetes. Body mass index was calculated from self-reported height and weight data, and correlated with socio-demographic and cultural belief variables. The age-adjusted prevalence of obesity was 40.39 percent. The spearman correlation found that women with higher BMI ($r_s = -0.42993, p = .0125$) and individual cultural knowledge scores ($r_s = -0.41730, p = .0218$) were significantly younger at age of type 2 diabetes diagnosis than women with lower BMI and individual cultural knowledge scores.

The women’s cultural belief model about type 2 diabetes was similar to the biomedical model. Women struggled to modify their traditional Caribbean diet and failed to engage in regular leisure physical activity which may have contributed to their high BMI. Inadequate health insurance and transnational migration prevented women from accessing regular medical care and effectively managing the disease. Afro-Caribbean women face an ongoing struggle to control their glucose levels and BMI to prevent the onset of type 2 diabetes complications.
Chapter I - Introduction

Type 2 diabetes accounts for approximately 90 percent of all cases of diabetes diagnosed in older individuals worldwide. Type 2 diabetes is a global epidemic and one of the major public health challenges of the 21st century. The World Health Organization (WHO) deems the prevention, diagnosis, and treatment of type 2 diabetes a priority (World Health Organization 2008). An estimate of the global increase in the number of people who develop diabetes suggests that the number will double from 151 million in 2000 to 300 million by 2025 (Zimmet et al. 2003). While the numbers of type 2 diabetes cases are expected to rise in every country worldwide, the greatest increases are expected in developing countries (Zimmet et al. 2003).

In the U.S., 20.8 million people (7 percent of the population) are estimated to have diabetes (14.6 million diagnosed) (Centers for Disease Control and Prevention 2007). Diabetes is estimated to be the sixth leading cause of death (Heron and 2007; Roglic et al. 2005). Approximately, 90 to 95 percent of all diagnosed cases of diabetes in the U.S. are type 2 diabetes (Centers for Disease Control and Prevention 2007). The increasing prevalence of type 2 diabetes has placed enormous financial demands on the U.S. health care system (Centers for Disease Control and Prevention 2007). Individuals with type 2 diabetes face a decline in quality of life as well as the economic costs of managing this incurable disease.
This dissertation research investigates if Afro-Caribbean women, primarily from Jamaica and Trinidad and Tobago share cultural beliefs about type 2 diabetes’ etiology, treatment, and symptoms and how this belief model along with their socioeconomic status influence their type 2 diabetes risk and their management of the disease. In addition, the presence of obesity and overweight in the study population was analyzed using self-reported height and weight data and correlated with socio-demographic and cultural belief variables.

**Statement of Problem**

In the U.S., migrants from the Caribbean and Latin America, particularly minority women bear a disproportionate burden of type 2 diabetes and its risk factors (Beckles and Thompson-Reid 2001; U.S. Census Bureau 2000; Centers for Disease Control and Prevention 2008; Smith and Barnett 2005; Roglic et al. 2005). Type 2 diabetes is characterized by hyperglycemia (high blood glucose levels) which is caused by the insufficient production of insulin or the cells’ inability to absorb insulin, a hormone produced by the pancreas (American Diabetes Association 2002).

As women, immigrants, ethnic minorities, and mostly low income or working class, Afro-Caribbean women occupy the lower levels of the class and power structure in the U.S. For over half a century, the Afro-Caribbean immigrant community has constituted substantial presence in the U.S. Their numbers are particularly high throughout Florida including the Tampa Bay region (U.S. Census Bureau 2000).
Despite the long history of an English-speaking Afro-Caribbean immigrant community in the U.S. as well as the continuing and increasing migration from this region, there is a dearth of literature on the health of this community. Informal discussions with members of this community reveal a wide-spread awareness about type 2 diabetes. In these discussions, individuals often shake their heads and voice concern about friends and close relatives struggling to live with the disease.

This dissertation research proposed a medical anthropological approach to bolster and expand the literature on the health of the English-speaking Afro-Caribbean immigrants in the U.S. The study population was drawn from southwest Florida where the largest English-speaking Afro-Caribbean community comprised of primarily Jamaicans and Trinidadians reside (U.S. Census Bureau 2000). Afro-Caribbean women between the ages of 35 and 90 years who self-reported type 2 diabetes diagnosis were eligible to participate in this research. Data on socio-demographic, medical history, and cultural beliefs were collected from study participants.

Qualitative and quantitative methods were used to study cultural beliefs about type 2 diabetes management and how socioeconomic status influenced the health care decisions of these women struggling to cope with the disease in their daily lives. Self-reported height and weight data were to calculate and categorize the body mass index (BMI) so as to determine the prevalence of overweight and obesity among study participants. Also, analyzed were the relationships of study participants’ BMI with socio-demographic, socioeconomic, and cultural belief variables.
Purpose and Significance of this Research

The purpose of this dissertation research is to investigate how socioeconomic status, cultural beliefs, and obesity are related to type 2 diabetes risk among primarily Jamaican and Trinidadian women of African descent in southwest Florida. This dissertation research uses a medical anthropology approach and methods of inquiry within the framework of the political economy theory of health and culture theory.

Proponents of political economy theory of health argue that in addition to considering the biological causes of disease, health disparities should be contextualized within the class and power structure of a capitalistic society. Biocultural anthropology also recognizes that cultural beliefs and practices about health also play a pivotal role in the decisions that individuals make on a daily basis. To measure cultural beliefs and explanatory models of disease, biocultural anthropology has borrowed cultural consensus theory which is also a statistical method from cognitive anthropology. This dissertation research examines if primarily Jamaican and Trinidadian women of African descent share cultural beliefs about type 2 diabetes’ etiology, treatment and symptoms and how this belief model, along with their socioeconomic status, influences their type 2 diabetes status and their management of the disease and health care decisions.

This dissertation research contextualizes the experiences of primarily Jamaican and Trinidadian women previously diagnosed with type 2 diabetes within the capitalist U.S. health care system. The structural barriers to accessing health care related to socioeconomic status are analyzed to determine how they constrain the choices that these
women make about managing the disease. Cultural consensus analysis was used to measure if there was a common cultural belief model about type 2 diabetes among primarily Jamaican and Trinidadian women. The cultural consensus analysis calculated study participants’ individual cultural knowledge scores which were correlated with socio-demographic variables to determine if there was a significant relationship. Qualitative methods were used to explore the meanings of cultural beliefs and to determine how they were translated into practices and behaviors that influenced the decisions that these women make about managing their condition.

To examine the biological component of the study population’s type 2 diabetes risk, self-reported anthropometric measurements of height and weight were used to calculate body mass index (BMI). BMI was used to determine the proportion of overweight and obesity in the study population. Overweight and obesity increase the risk for CVD, coronary heart disease, myocardial infarction, and cerebrovascular incident (Alberti, Zimmet, Shaw 2006; Groop 1999).

The analysis of the cultural beliefs, structural barriers, and overweight and obesity prevalence identified by this dissertation research contributes to the anthropological literature on political economy theory of health and Afro-Caribbean populations. This dissertation research also validates the use of the cultural consensus model to measure cultural beliefs about disease as proposed in biocultural anthropology. The results of this research will provide investigative and intervention models which can be applied to other
ethnic minority and marginalized groups at risk for type 2 diabetes and other chronic
diseases such as hypertension and cardiovascular disease.

The purpose of the applied aspect of this dissertation research is to inform public
health officials and medical professionals about their patients’ cultural beliefs and
practices about type 2 diabetes and the structural barriers that prevent their patients from
accessing adequate health care. Scholarly articles will be published in professional
journals targeting health officials and medical professionals who provide services to
Afro-Caribbean communities. This dissertation research will also make specific
recommendations about how to ameliorate the current health care services provided to
primarily Jamaican and Trinidadian women diagnosed with type 2 diabetes.

This dissertation research will be presented to the English-speaking Caribbean
organizations such as the Caribbean Community Association in Tampa. These
presentations will elucidate the challenges confronting individuals suffering with type 2
diabetes and suggest strategies that support and meet the needs of these individuals.

**Research Questions, Hypotheses, and Objectives**

**Research Questions**

This dissertation research was guided by the following research questions:

1. Do study participants (primarily Jamaican and Trinidadian women) share a
cultural belief model about type 2 diabetes?

2. What, if any, cultural beliefs about type 2 diabetes influence how study
participants make lifestyle and health care decisions?
3. How do structural barriers to health care created by socioeconomic status influence how study participants manage type 2 diabetes?

4. Are type 2 diabetes risk factors, overweight, and obesity present in this study population?

Research Objectives

The research objectives of this dissertation study were:

- To describe Jamaican and Trinidadian women’s cultural belief model about type 2 diabetes.
- To investigate the cultural beliefs about type 2 diabetes that influence Jamaican and Trinidadian women’s health care decisions.
- To identify the structural barriers that prevent Jamaican and Trinidadian women from managing type 2 diabetes effectively.
- To gather anthropometric data on height and weight (to calculate body mass index) so as to determine the prevalence of overweight and obesity, risk factors for type 2 diabetes in the study population.
- To provide practical, tactical, and actionable recommendations to the appropriate public health officials and Caribbean organizations about how to provide effective health services and communal support to Jamaican and Trinidadian women diagnosed with type 2 diabetes.

Research Hypotheses

The hypotheses tested in this dissertation research included:

H1. Jamaican and Trinidadian women with higher individual cultural knowledge scores are younger at age of type 2 diabetes diagnosis than Jamaican and Trinidadian women with lower individual cultural knowledge scores.

H0: There is no significant relationship between Jamaican and Trinidadian women’s age at type 2 diabetes diagnosis and their individual cultural knowledge scores.
H2. Jamaican and Trinidadian women diagnosed with type 2 diabetes with higher individual cultural knowledge scores had more years of type 2 diabetes duration than Jamaican and Trinidadian women with lower individual cultural knowledge scores.

H0: There is no significant relationship between years of type 2 diabetes duration of Jamaican and Trinidadian women and their individual cultural knowledge scores.

H3. Jamaican and Trinidadian women diagnosed with type 2 diabetes with higher individual cultural knowledge scores had more years of education than Jamaican and Trinidadian women with lower individual cultural knowledge scores.

H0: There is no significant relationship between the years of education of Jamaican and Trinidadian women diagnosed with type 2 diabetes and their individual cultural knowledge scores.

H4. Jamaican and Trinidadian women diagnosed with type 2 diabetes with higher individual cultural knowledge scores have lived in the U.S. longer than Jamaican and Trinidadian women with lower individual cultural knowledge scores.

H0: There is no significant relationship between the length of time that Jamaican and Trinidadian women have lived in the U.S. and their individual cultural knowledge scores.

H5: Jamaican and Trinidadian women with higher BMI were younger at age of type 2 diabetes diagnosis than Jamaican and Trinidadian women with lower BMI.

H0: There is no significant relationship between Jamaican and Trinidadian women’s age at type 2 diabetes diagnosis and their BMI.

H6: Jamaican and Trinidadian women with lower individual cultural knowledge scores had higher BMI than Jamaican and Trinidadian women with higher individual cultural knowledge scores.

H0: There is no significant relationship between the Jamaican and Trinidadian women’s individual cultural knowledge scores and their BMI.
Chapter II – Conceptual Framework and Literature Review

This chapter will discuss the conceptual frameworks of political economy of health theory and cultural consensus theory which were used to guide this dissertation research. The chapter will also review the literature on research conducted on the etiology of type 2 diabetes, the epidemiological distribution of type 2 diabetes in the U.S. and the Caribbean, and the cultural and migration experiences of Afro-Caribbean peoples throughout the Caribbean Diaspora.

Conceptual Framework

The conceptual framework used to guide this dissertation research is drawn from biocultural anthropology, often referred to as the biocultural synthesis (Armelagos, Leatherman, Ryan, and Sibley 1992; Goodman and Leatherman 1998; Singer 1995). Within the discipline of medical anthropology, Armelagos and colleagues (1992) and Goodman and Leatherman (1998) argue that there have developed two distinctive approaches to studying disease and ill health of populations. Sociocultural anthropologists study the socio-cultural aspects of disease and ill health. Biological anthropologists study the biological, physiological, and ecological components of disease and ill health. While both sociocultural and biological anthropological approaches to disease and ill health have their strengths, they are inconsistent with anthropology’s holistic approach to understanding the human condition. Sociocultural anthropologists
fail to consider the biological consequences of changing cultural beliefs and practices within the capitalistic global system. Biological anthropologists often ignore the socio-cultural and political economic factors that influence human biology. The biocultural synthesis seeks to bridge the chasm between sociocultural and biological anthropological study of disease and ill health so that human biological conditions can be understood through the processes of history and the environment (Armelagos et al. 1992; Goodman and Leatherman 1998; Singer 1998).

Integrating biological and cultural anthropological perspectives of disease and ill health has been challenging for anthropologists (Armelagos et al. 1992). One challenge to the biocultural perspective is that most anthropologists are not trained in the skills necessary to conduct biological and cultural anthropological research and have do not have in depth understanding of theoretical frameworks in each others’ disciplines (Goodman and Leatherman 1998). Sociocultural anthropologists who usually study small population sizes have extensive experience with qualitative methods and analysis, but little or no experience with quantitative methods and analysis or training in collecting biological data. Additionally, many sociocultural anthropologists have a bias against using quantitative methods and argue that the biomedical model is not applicable to the study of traditional populations globally (Goodman and Leatherman 1998; Armelagos et al. 1992). Biological anthropologists have been trained in quantitative methods and analysis, but have limited experience with qualitative methodology and analysis. Additionally, biological anthropologists do not know how to systematically study cultural
phenomena and have concerns about the validity and reliability of cultural studies. As a result, there has been a struggle to identify areas of anthropological research and methodologies where both sociocultural and biological perspectives can find common ground (Goodman and Leatherman 1998). Despite the challenges confronting the biocultural synthesis, the discussion continues and biocultural research has an increasing presence and visibility in the anthropological literature (Goodman and Leatherman 1998).

**Political Economy of Health**

Originally, the concept of political economy was used to describe how the means of production and consumption were organized within the laws, customs, and government regulations of a capitalistic society. Friedrich Engels, Thomas Maltus, Karl Marx, David Ricardo, and Adam Smith wrote extensively about political economy. Engels (1843:1) offered “political economy came into being as a natural result of the expansion of trade, and with its appearance elementary, unscientific huckstering was replaced by a developed system of licensed fraud, an entire science of enrichment.” Political economy formed the basis of modern economics and has been the foundation of schools of thought in the disciplines of anthropology, ecology, geography, history, political science, and sociology (Baer 1982).

The first linkages between political economy and ill health were made by Marx and Engels (Morgan 1987). Both Marx and Engels observed that the health of British workers had declined due to the poor working conditions. In “Das Kapital,” Marx (1887) examined the medical reports of British factory workers and noted the negative impact
that the long work days had on the workers, particularly the children who were under thirteen. These reports stated that the children had numerous physical deformities and suffered from asthma, consumption and other diseases related to the factory pollutants and demanding work. Marx (1887:380-381) stated, “après moi le déluge! is the watchword of every capitalist and of every capitalist nation. Hence capital is reckless of the health or length of life of the labourer, unless under compulsion from society.”

In his seminal work, “The Condition of the Working Class in England,” Engels (1845) argued that the workers were healthier and enjoyed better quality of life prior to the industrial revolution. As an example, he noted that the health of the men, women and child who were employed in British mines significantly declined due to pollution and the hard labor they were required to perform on a daily basis. Women and children who had worked in the mines for extended duration suffered deformities in their spines, pelvises and lower extremities. Along with their male counterparts, workers suffered from digestive and heart diseases that caused them to age prematurely. Consequently, by the time they reached their 40s, many were unable to work. Using medical testimony Engels (1845) stated that the miners often died in their late 40s from consumption and asthma which he attributed to the pollution to which they had been exposed in the mines (Engels 1845).

In the discipline of anthropology, the political economy of health has been defined as “a critical endeavor which attempts to understand health-related issues within the context of the class and imperialist relations inherent in the capitalist world system”
Proponents of political economy of health argue that disease and ill health is a “struggle” for individuals who are subjected to the forces dictated by the capitalist world system (Baer, Singer, and Johnsen 1986). These macro-level social, political and economic forces create structural barriers and inequalities such as socioeconomic class and racism that are the primary explanations for the health disparities found among ethnic minorities and marginalized populations (Baer 1996; Singer 1995; Schoenberg et al. 2005).

An example of the political economy of health perspective is the study of poverty as a social condition that individuals experience due to their low socioeconomic status; which is in turn, caused by the socio-political forces in a capitalist society. Yet poverty is more than a social condition; it causes diseases and physical conditions that severely debilitate individuals (Leatherman 2005; Thomas 1998). Consequently, the proponents of the biocultural synthesis use the political economy of health framework to argue that societal forces like power and the lack of access to resources, that are at the root of hunger cause and limit food intake, should be studied along with the physiological adaptations of malnourished individuals (Leatherman 2005; Thomas 1998).

Political economy of health as a conceptual framework has gained widespread acceptance in medical anthropology since the 1970s (Baer 1982; Singer 93). Morgan (1987) argued that the political economy of health in anthropology consists of three major perspectives: Classical Marxist analysis, cultural critiques of medicine and the dependency/world system theory. Classical or orthodox Marxists examine how tenets of
capitalism (e.g. the accumulation of wealth), exploitation of workers, power, and class structure lead to health disparities and ill health in general. Proponents of the cultural critiques of medicine argue that biomedicine can have a negative impact on an individual’s health and reproduce the low class status of women and minorities. However, biomedicine ignores the macro-level social, political and economic forces operating in a capitalist society. Dependency/world system theory analyzes the impact that capitalism, imperialism and colonialism has had on the health of populations in the developing world. Proponents of political economy of health do not fit neatly placed into one of these perspectives; instead anthropologists may fall along a range. For example, some anthropologists may strongly advocate the classic Marx approach, but they also incorporate dependency/world system theory into their research (Morgan 1987).

Critics of the political economy of health theory argue that the three perspectives fail to address the “cultural dimension” of socioeconomic inequalities and dismiss the interactions between biobehavioral responses and the environment (Dressler et al. 1998; Leatherman et al. 1993). For example, even within a capitalist society with a biomedical system, indigenous medical systems continue to exist and individuals make choices about how to serve their health by using both systems (Morgan 1987). Cultural beliefs and practices about disease and ill health also play a role in how individuals negotiate their formal and informal health care systems and/or integrate two systems (Baer 1982). Dressler and colleagues (1998) argue that most biocultural studies using the political economy of health framework measure proxies for socioeconomic status such as income
and education attainment, but fail to measure cultural beliefs or attitudes towards health. Leatherman and colleagues (1993) contend that researchers using the political economy of health framework frequently do not consider how biological conditions interact with cultural and environment processes.

The political economy theory of health provides biocultural anthropologists with a framework that incorporates both biological and sociocultural components of disease and ill health. Critical medical anthropology uses the political economy of health framework to explore how individuals’ ill health and disease are related to both the cultural and biomedical experience (Singer 1998). Critical medical anthropology views the tensions that individuals’ experience with the biomedical system as part of the ongoing power, class, and gender conflict that are inherent in capitalistic societies. In addition, critical medical anthropology seeks to understand the social origins that trigger disease and ill health such as poverty, poor working conditions, pollution, and poor housing (Singer 1998). This perspective of political economy of health is a strongly classical Marxist analysis and closely aligns with Engels’ work on the ill health of British miners discussed previously.

**Acculturation**

Acculturation is a broad anthropological concept that can be narrowly defined as "the process whereby migrants change their behavior and attitudes toward those of the host society" (Rogler, Cortez, and Malgady 1991). Researchers have used unidimensional and multidimensional models of acculturation to understand the association between
acculturation and health disparities (Lara et al. 2005). Unidimensional models view acculturation as a linear continuum where an individual moves from “low acculturation” to “high acculturation” into the host society (Cuéllar, Arnold, and Maldonado 1995; Rogler, Cortez, and Malgady 1991). In the unidimensional model, acquiring the cultural beliefs and behaviors of the host society means that individuals are assimilated (i.e., immersed into the host society) losing their original cultural identity completely (Algeria et al. 2007; Rogler, Cortez, and Malgady 1991).

In bidimensional models, individuals acquiring the cultural beliefs and behaviors of the host society do not necessarily disengage from their original culture (Lara et al. 2005). Bidimensional models view acculturation as a spectrum and where an individual lies, will vary according to their culturally specific experiences with the host society (Algeria et al. 2007; Cabassa 2003). Individuals may choose to completely reject one or the other cultural. Alternatively they may retain the cultural beliefs and practices of both cultures, thereby creating a bicultural identity or be disassociated from both cultures (De la Cruz, Padilla, and Agustin 2000; Siatkowski 2007). Yet it should be noted that individuals may not have control over cultural change due to the influence of external factors such as institutional racism, governmental policies, and immigration laws (Lara et al. 2005). Institutional racism is described as racism and discrimination that occurs more subtly because they are “embedded in social institutions” (Vasquez and Wetzel 2009:1558). Also, wealth and education attainment, employment and ability to use
English along with the governmental policies can make a migrant’s integration into the host country smoother or more difficult (Lara et al. 2005; Wolf 1993).

Due to the intangible nature of acculturation, researchers have sought to identify proxy variables such as language preference and length in the U.S. as measures of acculturation (Siatkowski 2007). Some studies have found that immigrant populations have positive health outcomes or are at less risk for chronic diseases than individuals born in the U.S. (Jaber et al. 2003; Hazuda et al. 1988). Other studies have found that adverse health outcomes for migrants are associated with duration of residency in the U.S. and/or higher degrees of acculturation (Himmelgreen et al. 2004; Mooteri et al. 2004). Detractors criticize the validity of acculturation measurements citing their lack of rigor and consistency (Hunt et al. 2004; Salant and Lauderdale 2003).

Another area of contention regarding acculturation research (particularly Hispanic health research) is that proxy variables such as preferred language are measured without considering that individuals may engage in other cultural practices borrowed from the host culture (Hunt et al. 2004; Rogler, Cortez, and Malgady 1991). One obvious flaw is that the cultural characteristics of immigrant groups identified by these measures may be unfounded assumptions and/or blatant and erroneous stereotyping. For example, ethnic and gender stereotypes such as the machismo of Latino men are often used to explain behaviors and beliefs of study populations without further examination (Hunt et al. 2004). Another shortcoming is that the concept of “main stream” society crucial to understanding the acculturation process of migrants is often nebulous and ill-defined.
Additionally, many acculturation studies either disregard or underestimate the crucial role that structural barriers such as poverty, education, transportation, and lack of English knowledge play in creating health disparities (Hunt et al. 2004).

The overarching criticism of this biocultural approach of political economy and acculturation is that “culture” throughout the anthropological literature is not clearly conceptualized (Dressler 2005; Hunt et al. 2004). Thus, culture cannot be effectively measured as related to the association of socioeconomic status and health. Despite the myriad debates and discussions regarding the meaning of culture in anthropology over many years, Edward Tylor’s description of culture as “that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits are acquired by man as a member of society” is still the most widely accepted definition in the field (Weiss 1973). Biocultural anthropologists have sought to operationalize the concept of culture in order to comprehend its relationship to human biological conditions.

*Cultural Consensus Analysis*

In response to this criticism that the concept of culture is not clearly defined, biocultural anthropologists have borrowed the concept of “cultural models” from cognitive anthropology (D’Andrade 1995). A cultural model is described as an individual’s reasoning of their environment through an organized set of words or concepts (cognitive schema) drawn from one or more cultural domains shared by the social group (D’Andrade 1995). What distinguishes the individual’s understanding of a cultural model from mere general knowledge is that this understanding is shared among
others in the group to certain degree. However, the individual’s ability to act in accordance with the cultural model may be constrained at times due to structural barriers such as limited financial resources or indigence (D’Andrade 1995).

To measure “cultural beliefs,” Romney, Weller, and Batchelder (1986) developed the cultural consensus model. Cultural consensus analysis which is both a theory and a statistical method helps identify the cultural beliefs of populations as they relate to ill health and disease. However, cultural beliefs can often be constrained by structural barriers to the health care system. The cultural consensus model statistically measures the level of agreement among individuals and determines an individual’s cultural knowledge based on his/her responses compared to the overall group. The cultural consensus model is the quantitative analysis of qualitative data about the understandings drawn from a cultural model (Romney et al. 1986). The cultural consensus model assumes that there is shared cultural knowledge in many cultural domains and that individuals respond to the questions independently (Weller 1987).

Aunger (1999) criticized the cultural consensus model, arguing that it is an “idealistic” approach to studying culture which measures the frequency of beliefs and that its reliability and interpretation are problematic. Aunger (1999) posited that the transmission of beliefs creates culture and therefore, ethnography with all its flaws is the most “realistic” method to study culture.

Garro (2000) contends that although cultural consensus analysis identifies patterns of agreement about specific areas, it is insufficient to merely study a cultural
belief; rather it is imperative to understand and interpret their meaning. Like cultural consensus theory, the cultural model theory is based on D’Andrade’s (1995) concept of the cultural model. Garro (2000) argues that, in fact, individuals’ cultural explanation about type 2 diabetes is formed through collective memory and a social framework from which they reconstruct their knowledge and understand the past. Thus, the cognitive process is integrated with cultural meaning and the individual experience. To gather data to learn about cultural meaning about type 2 diabetes, Garro (2000) advocates that in-depth qualitative interviews be conducted along with conducting the cultural consensus analysis.

Despite these criticisms, the cultural consensus model has been used to discover cultural explanatory models about type 2 diabetes (Daniulaityte 2004; Garro 2000; Weller et al. 1999; Ratanasuwan et al. 2005;), hypertension (Dressler et al. 2000; Dressler et al. 1998; Garro 1988), malaria (Ruebush et al. 1992), disease/illness concepts (Weller 1984), HIV/AIDS (Baer et al. 2004), and cancer risk (Chavez et al. 1995).

As stated previously, it is insufficient to only study cultural beliefs, biocultural anthropology requires an understanding of how these beliefs translate into practices, that is, how these behaviors relate to human biological conditions. Dressler (2005:27) proposed the concept of cultural consonance to “the degree to which individuals in their own behaviors approximate the prototypes for behavior encoded in a cultural model.” In studies dealing with blood pressure and depression, cultural consensus analysis is first used to determine the level of agreement in cultural domains of lifestyle and social
support, then cultural consonance was measured by determining the association of individual profile which includes cultural beliefs and health outcomes with the collective profile which is the ideal (Dressler and Bindon 2000; Dressler et al. 2007).

**Literature Review**

*Etiology of Type 2 Diabetes*

Type 2 diabetes is an incurable chronic debilitating condition which is difficult to treat (American Diabetes Association 2002). The disease affects the patient’s quality of life and requires long-term management. If not carefully managed, type 2 diabetes and its sequelae can result in death. The sequelae of type 2 diabetes include blindness, lower limb amputation, renal disease, cardiovascular disease (CVD), and a stroke (American Diabetes Association 2002; Bennett 2000). In fact, people with type 2 diabetes are two to four times more likely to develop CVD or to have a stroke than those without the disease (American Heart Association 2008; Zimmet and Thomas 2003).

Type 2 diabetes is a metabolic syndrome disease. Researchers have focused on understanding the pathogeneses and the evolutionary paradigm of the metabolic syndrome diseases. In 1988, Reaven proposed the concept of Syndrome X, arguing that insulin resistance and compensatory hyperinsulinemia (abnormally high levels of insulin in the blood) underlie the clustering of metabolic disturbances and that Syndrome X was an important risk factor for CVD (Isomaa 2003). In 1923, Kylin recognized co-occurrence of hypertension, hyperuricemia (an abnormally high level of uric acid in the
blood), obesity, and gout (Isomaa 2003; Groop 1999). The World Health Organization (WHO) refers to the clustering characteristics related to increased risk for CVD, coronary heart disease, myocardial infarction and a cerebrovascular incident (stroke) as the “metabolic syndrome” (Groop 1999).

The metabolic syndrome is characterized by abdominal (central) obesity, differing degrees of glucose of intolerance, dyslipidemia (an increase in triglyceride levels, decrease in HDL cholesterol levels, and small denser particles of LDL cholesterol), and usually hypertension (Isomaa 2003). A diabetic individual with dyslipidemia is at significant risk for the development of CVD (American Diabetes Association 2002). Originally, the working definition of the WHO stated that individuals with type 2 diabetes or impaired glucose tolerance or insulin resistance (even with normal glucose tolerance) are considered to have the metabolic syndrome when two more of the following criteria are present: hypertension, dyslipidemia, obesity (high BMI and/or high waist-hip ratio), microalbuminuria (urinary albumin excretion rate) (World Health Organization 1999; Groop 1999). In 2004, WHO re-defined the criteria of the metabolic syndrome to recognize the growing obesity epidemic and to make clinical diagnosis easier (Alberti, Zimmet, and Shaw 2006). The new criteria for diagnosing the metabolic syndrome is that an individual have central obesity (waist circumference - ethnic specific) and two of the four following conditions: raised triglycerides, reduced HDL-cholesterol, hypertension, and type 2 diabetes (raised fasting plasma glucose) (Alberti, Zimmet, and Shaw 2006).
Over the years, researchers determined that a complex interrelation of environmental, genetic, and metabolic conditions contribute to the pathogenesis of type 2 diabetes. Type 2 diabetes is a heterogeneous condition that cannot be attributed to one pathological mechanism (Groop 1999). The etiology of type 2 diabetes is characterized by hyperglycemia (high blood glucose levels) with insulin resistance and varying degrees of insulin deficiency (American Diabetes Association 2003).

Insulin, a hormone produced by the pancreatic β-cells plays a crucial role in maintaining a balance in the production of glucose (a simple form of sugar) by the liver and its subsequent utilization by the body for energy (Groop 1999). Approximately, 70 percent of glucose entering the body from the food consumed is absorbed into the periphery tissues (mainly the muscle), while the liver absorbs the remaining glucose. Insulin controls the rate at which the liver produces and secretes glucose (Groop 1999). Glucose is stored in the liver as a form of glycogen. When blood glucose levels are low, glycogen is converted to glucose and released into the bloodstream. Once there is sufficient glucose in the blood, insulin signals the liver to cease glucose production (Groop 1999). When functioning normally, the pancreas is able to continually measure blood glucose levels and produce the necessary amount of insulin. In general, the body strives to maintain a blood glucose concentration between 80 to 140 mg/dL. There is evidence that the ability of insulin to stimulate the glucose uptake varies “widely” by individual (Reaven 2000). This variation in insulin activity suggests a genetic component.
Insulin resistance occurs when the periphery tissues are unable to absorb the necessary amount of glucose as needed to function normally even when there is sufficient glucose in the bloodstream (Reaven 2000). The majority of people with insulin resistance are able to sustain compensatory hyperinsulinemia (abnormally high levels of insulin in the blood) by secreting large amounts of insulin in order to maintain a close to normal blood glucose levels. The more insulin resistant a person is, the higher the blood glucose levels. Insulin resistant individuals who are unable to maintain normal glucose tolerance are considered to have “impaired glucose tolerance.” Obesity and physical activity are the variables most associated with modulation insulin action in insulin resistance, but they do not cause the condition and are associated with only 25 percent of the variation of insulin action found in different individuals (Reaven 2000). However, abdominal obesity particularly in women has been linked to insulin resistance and type 2 diabetes (Groop 2000; Lev-Ran 2001; Wright-Pascoe and Lindo 1997).

Type 2 diabetes develops in insulin resistant individuals, when the pancreas is unable to secrete sufficient insulin to compensate for defective insulin action (Reaven 2001). Most individuals diagnosed with type 2 diabetes are also insulin resistant. Insulin resistance and hyperinsulinemia are the conditions that frequently precede the onset of type 2 diabetes (Reaven 2001). However, a minority of insulin resistant individuals develop type 2 diabetes (Reaven 2001). The American Heart Association (2004) estimates that approximately 60 million Americans are insulin resistance and that one of every four will eventually develop type 2 diabetes. Insulin resistant along with
compensatory hyperinsulinemia predisposes an individual to the development of coronary heart disease as well as essential hypertension (though not all hypertensive individuals are insulin resistant) (Reaven 2001).

The risk factors associated with type 2 diabetes are familial history, diet, sedentary lifestyle, hypertension, and obesity, as well as ethnicity (American Diabetes Association 2002). Ethnic groups such as African Americans, American Indians, Mexican Americans, Afro-Caribbean populations, and indigenous peoples of the Pacific are at higher risk for type 2 diabetes (Hunt et al. 1998; Neel et al. 1998). Although most people develop type 2 diabetes after middle age, there have been increasing cases diagnosed in children and adolescents (Lieberman 2003; Zimmet et al. 2003). Type 2 diabetes in adults has been strongly linked to obesity, but the correlation in children has not been as strong (Lieberman 2003). Individuals with BMI over 23 at of higher risk of developing diabetes (Zimmet et al. 2003).

The symptoms of type 2 diabetes include thirst, hunger, blurred vision, weight loss, itchy skin and polyuria (excess urination) (Lieberman 2003; World Health Organization 2008). The primary methods used to diagnose and screen for type 2 diabetes are risk assessment questionnaires and biochemical tests (World Health Organization 2003). For these tests to be effective, they must be valid (reflect the actual disease status of individual), reliable (replicable results) and reproducible (similar results when repeated on same individual) (World Health Organization 2003). Additionally, the World Health
Organization (WHO) (2003) notes that the following characteristics must be met for these tests to be deemed effective:

- **Sensitivity** – Probability that an individual with the disease tests positive.

- **Specificity** – Probability that an individual who does not have the disease tests negative.

- **Positive predictive value** – Probability that an individual has the disease when the test result is positive.

- **Negative predictive value** – Probability that an individual does not have the disease when the test result is negative.

Ideally, a test incorporates both high sensitivity and specificity, but this is difficult to attain. Consequently, there is often a trade off because increasing one decreases the other. Also, a test that is high in sensitivity and specificity will have a positive predictive value in a population with high prevalence (Alberti and Zimmet 1998).

Risk assessment questionnaires allow researchers to calculate risk scores from points assigned to questions about risk factors such as age, weight, lifestyle, and familial history of type 2 diabetes as well as symptoms such as extreme thirst, frequent urination and unexplained weight loss in order determine if the subject is at high or low risk for having undiagnosed type 2 diabetes (American Diabetes Association 2005; Griffin et al. 2000; Engelgau et al. 2000). While risk assessment questionnaires provide some indication of risk and are educational, they should be used as a complement to biochemical tests rather than the sole means of testing for asymptomatic cases of type 2
diabetes because they are imprecise (American Diabetes Association 2003 Engelgau et al. 2000).

Biochemical tests used to diagnose and screen for type 2 diabetes include urinary glucose, oral glucose tolerance test (OGTT) and fasting plasma glucose (FPG) (American Diabetes Association 2004; World Health Organization 2003). Urinary glucose is not considered a useful test for diabetes because it has low sensitivity (21 to 64 percent) and high specificity (98 percent), but it may be used when OGTT and FPG are not readily available (Alberti and Zimmet 1999).

The oral glucose tolerance test (OGTT) is used when plasma glucose levels are considered “equivocal,” for example in epidemiological studies or during pregnancy (Alberti and Zimmet 1998). The oral glucose tolerance test is administered after three days of normal diet and physical activity. The subject then fasts for eight to fourteen hours overnight (only drinking water) and is given in the test in the morning. The subject drinks 75 g anhydrous glucose or 82.5 g of glucose monohydrate in 250 to 300 ml of water over a 5 minute period. Blood samples are collected 120 minutes from the beginning of the drink (Alberti and Zimmet 1998). The WHO criteria should then be used to diagnose type 2 diabetes; type 2 diabetes is classified as ≥ 11.1 mmol/l (≥ 200 mg/dl) (see Table 1).
Table 1. Criteria for the Diagnosis of Diabetes Mellitus

<table>
<thead>
<tr>
<th>Positive findings from any two of the following tests on different days</th>
<th>Glucose Concentration mmol per L (mg per dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diabetes mellitus</strong></td>
<td></td>
</tr>
<tr>
<td>Symptoms plus casual plasma glucose concentration</td>
<td>≥ 11.1 (≥200)</td>
</tr>
<tr>
<td><em>Or</em></td>
<td></td>
</tr>
<tr>
<td>Fasting plasma glucose</td>
<td>≥7.0 (126)</td>
</tr>
<tr>
<td><em>Or</em></td>
<td></td>
</tr>
<tr>
<td>2 hour post glucose load</td>
<td>≥11.1 (≥200) after a 75-g glucose load</td>
</tr>
<tr>
<td><em>or both</em></td>
<td></td>
</tr>
</tbody>
</table>

*Impaired Glucose Homeostasis*

**Impaired glucose tolerance**

| Fasting plasma glucose (if measured)                         | <7.0 (<126)                              |
| *or*                                                         |                                          |
| 2 hour post glucose load                                      | from ≥7.8 (≥140) to <11.1 (<200)        |

**Impaired fasting glucose**

| Fasting plasma glucose (if measured)                         | from 6.1 (≥110) to 7.0 (<126)           |
| *or*                                                         |                                          |
| 2 hour post glucose load                                      | 7.8 (<140)                              |

**Normal**

| Fasting plasma glucose                                       | <6.1 (<110)                              |
| *or*                                                         |                                          |
| 2 hour post glucose load                                      | <7.75 (<140)                             |


The oral glucose tolerance test (OGTT) is widely used by WHO and many researchers because it has a slightly higher sensitivity than fasting plasma glucose (FPG).

The WHO and American Diabetes Association (ADA) recommend that study participants
be re-tested with OGTT on another day to confirm the diagnosis of diabetes (American Diabetes Association 2004). OGTT is considered to be a limited test because of poor reproducibility. Another limitation of OGTT is that the researcher cannot be sure that the subject maintained the required fast and this may compromise the results.

The ADA considers fasting plasma glucose (FPG) to be the best diabetes screening test in clinical settings because drawing blood samples is a regular component of a medical check-up. This makes it easy, fast, inexpensive, and convenient for patients (American Diabetes Association 2004). Like the OGTT, FPG is most effective when administered in the morning after an 8 hour fast (drinking only water), but “casual plasma glucose measurements” can be taken even if the subject eats or drinks shortly before the test (American Diabetes Association 2004). ADA (2004) recommends that study participants with FPG $\geq 7.0$ mmol/l ($\geq 126$ mg/dl) be re-tested on another day to confirm the diagnosis of diabetes. FPG has a sensitivity of 40 percent to 65 percent and a specificity $> 90$ percent for values $6.1 – 7.8$ mmol/l. If a study participant’s FPG is $< 7.0$ mmol/l ($< 126$ mg/dl) and there is strong suspicion of diabetes, then the OGTT should be conducted on another day (American Diabetes Association 2004).

The blood samples collected after FPG and OGTT tests should be tested in an accredited laboratory that uses enzymatic assay techniques to test the plasma glucose concentration (American Diabetes Association 2004). If the plasma glucose levels cannot be determined immediately, the blood should be placed in a test tube with sodium...
fluoride, centrifuged, and the plasma frozen until laboratory analysis can be conducted (Alberti and Zimmet 1998).

_Treatment of Type 2 Diabetes_

Since type 2 diabetes is an incurable disease, it is imperative that individuals diagnosed with the disease monitor their glucose levels to prevent the onset of complications. The ADA recommends that individuals diagnosed with type 2 diabetes develop a “diabetes care plan” with their health care professional. This diabetes care plan involves the prescription of oral hyperglycemic agents and/or insulin as determined by the physician’s assessment of the individual’s glucose levels along with the adjustment of diet and regular physical activity. Lifestyle changes that include diet and physical activity along with the use of the oral hyperglycemic agent, Metformin has been shown to prevent or delay the onset of type 2 diabetes (Knowler et al. 2002).

The ADA (2008) guidelines are that individuals diagnosed with type 2 diabetes should visit a physician or diabetes health provider every three months. During this visit, physicians should test blood pressure and conduct ophthalmoscopy, foot, skin and neurological examinations. Individuals with poor glycemic control should have the glycosylated hemoglobin (HbA1c) test every three months, while individuals with good glycemic control should have the test every six months. Blood is drawn to test HbA1c which is formed when glucose joins with the red blood cell over its 120 day lifespan. High HbA1c (< 7 percent) is an indicator of poor glucose control and increases the risk of complications such as nephropathy and retinopathy.
The ADA (2008) also recommends that individuals diagnosed with type 2 diabetes use glucometers to test their blood glucose levels on a daily basis to help control type 2 diabetes. Glucometers are portable battery operated machines. Noninvasive glucometers are now marketed, but most of these machines require that individuals stick their fingers with a lancet and place a drop of blood on a strip coated with glucose oxidase, dehydrogenase, or hexokinase which combines with plasma glucose. The strip is then inserted into the glucometer which measures and displays the glucose level. By testing their glucose levels, individuals can determine which foods cause their glucose levels to increase and they can adjust their diet accordingly. Individuals should record their daily glucose levels so they can keep track of fluctuations of their glucose levels and report them to their physicians and diabetes educators. In addition to eating healthy foods at the right time and exercising regularly, individuals diagnosed with type 2 diabetes should also protect their feet and examine them regularly to prevent injury - which in a worst case scenario could lead to amputations.

Pathogenesis of Type 2 Diabetes

Thrifty Genotype Hypothesis

The research in the area of genetics and type 2 diabetes has focused on the "thrifty genotype" hypothesis as an explanation for the predisposition to the disease in certain modern populations. Proposed by Neel (1982), the hypothesis suggests that some hunter and gatherer populations possessed a genotype that permitted a metabolic response to intermittent food stress. This metabolic response included the production of insulin at
"greater-than-normal availability" that resulted in the efficient storage of fat and utilization of energy (Neel 1982:355). This genotype was a favorable trait that was selected for by the environment. However, as the diets of these populations modernized, the thrifty genotype became a disadvantageous trait and resulted in a genetic predisposition for diabetes, obesity, and their related health conditions. Originally, Neel (1982) referred to insulin-dependent diabetes mellitus (IDDM), but as diabetes research revealed the distinctive etiology of type 1 and type 2 diabetes, the hypothesis was applied to type 2 diabetes.

Subsequent research on the thrifty genotype hypothesis posits that in addition to diet, the intense physical activity of these populations assisted in the maintenance of low insulin levels (Bindon and Baker 1997). Studies have shown that increased physical activity by individuals at high risk for type 2 diabetes reduces the incidence of the disease. Athletes who engage in rigorous exercise like early hunters and gatherers, secrete less insulin when experiencing glucose load and have lower peak glucose levels than those who do not exercise intensively (Cordain et al.1997). This finding has led to the conclusion that the reduction of physical activity in populations with the thrifty genotype has contributed to the onset of type 2 diabetes.

Data to support the thrifty genotype have been gathered primarily on the Pima Indians who have an extremely high incidence of obesity as well as of type 2 diabetes (60 percent) which develops in individuals as young as 20 to 30 years of age (Chance et al. 1994; Lindsay and Bennett 2001). The Pima Indians of Southern Arizona were displaced
by the U.S. government and forced to live on reservations. With no water to irrigate their lands, the Pima relied on the government for their food supply, which was comprised of foods that were high in fat and sugar such as lard, sweet rolls and cakes. In contrast, the Mexican Pima Indians whose lifestyle reflects a more traditional diet and more physical activity due to the techniques used to grow their food, have a much lower incidence of type 2 diabetes (Neel, Weder, and Julius 1998).

Despite the research studies showing the high association of obesity with type 2 diabetes, obesity does not necessarily lead to the onset of type 2 diabetes (Lev-Ran 1999; Wright-Pascoe and Lindo 1997). In Fiji, the Asian Indian population has high incidences of type 2 diabetes, but very low rates of obesity (Zimmet et al. 1990). Other Pacific populations such as those in Polynesia and Micronesia have more substantial rates of obesity than those in Fiji, along with even higher incidences of type 2 diabetes than explained by the obesity rates alone (Bindon and Baker 1997). Research suggests that it is more likely that obesity and type 2 diabetes co-occur due to underlying metabolic disruptions rather than the former being the cause of the latter (Bindon and Baker 1997).

Additionally, Neel, Weder, and Julius (1998) posit that it is unlikely that one gene is responsible for the onset of type 2 diabetes. Instead, there are probably an array of genes acting in concert to form the genotype making these populations susceptible to type 2 diabetes and other insulin resistance diseases such as hypertension and obesity. As a result, type 2 diabetes should not be categorized as a disease, but rather one disease in a syndrome. The syndrome is comprised of several diseases including hypertension,
differing levels of glucose of intolerance, dyslipidemia, and obesity (Lev-Ran 1999; Neel, Weder, and Julius 1998).

Opponents of the thrifty genotype hypothesis argue that it is an oversimplified Westernized version of the transition from hunting and gathering societies to agricultural societies (Allen and Cheer 1996). In contrast to Allen and Cheer (1996), Armelagos (1990) theorized that agriculturists like hunters and gatherers experienced periodic famine and food stress. Agriculturists were dependent upon one or two staple crops, primarily carbohydrate cereal crops such as rice, wheat, and barley and tubers such as potatoes and cassava that resulted in nutritional deficiencies when these crops failed to produce. However, Paleolithic diets were nutritionally balanced with approximately 65 percent plant (fruits, roots, legumes) and 35 percent animal (Lieberman 2003; Jenike 2001). Given that a consistent nutritionally rich food surplus is a recent occurrence in human history (the last two hundred years for European populations); these detractors argue that a more realistic explanation of the evolution of the thrifty genotype must be more complex than suggested by the thrifty genotype hypothesis.

Since European populations have nutritionally rich diets and have low incidences of type 2 diabetes when compared to other populations, Allen and Cheer (1996) suggested that they possess a "non-thrifty" genotype. The selective advantage of this non-thrifty genotype has been difficult to identify. One explanation is that Europeans have experienced a population bottleneck and have lost the thrifty genotype due to random genetic drift. However, this explanation is highly unlikely because the thrifty
genotype is present in some modern Europeans and would have been an advantage during periods of nutritional stress so it should have been selected for as in other populations (Allen and Cheer 1996). Another explanation is that in societies with social stratification, status rather than genotype would provide an advantage during food shortages, thereby reducing the selective advantage of the thrifty genotype. However, since the majority of the population in any stratified society are of the lower classes, the thrifty genotype would continue to be an advantageous trait as they compete amongst themselves for the limited food resources so the modern European populations would have a wider distribution of the thrifty genotype than reflected in their type 2 diabetes rates (Allen and Cheer 1996).

In response to the inadequacy of these two explanations of selective advantage of this non-thrifty genotype, Allen and Cheer (1996) investigated the environment in which Europeans lived in order to identify stressors that could have played a role in selecting the thrifty genotype. As a result of their research, Allen and Cheer (1996) proposed that there is a direct and specific correlation between the low type 2 diabetes rates in Europeans and their high rates of lactose tolerance. This correlation provides a more substantive explanation of the selection of the non-thrifty genotype in this population.

Most humans are able to digest lactose, the main carbohydrate found in most mammalian milk, until the age of three to four years, but their lactase (the enzyme in the small intestine responsible for the digestion of lactose in milk) activity declines after
weaning. However, in a minority of humans lactase activity continues at a high level into adulthood. These people are able to consume milk with no ill effects and are considered to be lactose tolerant. Populations with high levels of lactose tolerance have traditional dietary dependence upon milk and its products. As a result, lactose tolerance is viewed as a genetic trait that provides an advantage in these populations (Cavalli-Sforza et al. 1996). Lactose intolerance exists in most of the world's populations with the exception those in northwestern Europe, northern India (traditionally cattle-herders), and a few African groups such as the Fulani and Tutsi, milk-drinking pastoralists (Allen and Cheer 1996). Allen and Cheer (1996) contend that the non-thrifty genotype was selected for in European populations because lactose tolerance made milk sugars available to adults who would normally not be able to absorb them. Consequently, the non-thrifty genotype released a slow insulin trigger that had a selective advantage against the development of type 2 diabetes and obesity in populations with diets that included dairy along with high carbohydrate and fat intakes.

Allen and Cheer (1996) argue that there is a strong connection between the ability to absorb lactose and the non-thrifty genotype. In the Caribbean, the decimated Amerindians, enslaved Africans, indentured Indians (from southern areas of India) and the migrant Chinese were members of ethnic groups that were overwhelmingly lactose intolerant so they did not possess the non-thrifty genotype (Molnar 2000). Consequently, contemporary Caribbean populations are more likely to have the thrifty genotype. The thrifty genotype was advantageous during harsh conditions of slavery and colonialism.
when there was nutritionally poor foods and intensive physical activity. However, when modern Caribbean populations gained access to nutritionally rich foods and adopted a more sedentary lifestyle, type 2 diabetes developed at high frequencies. The thrifty genotype was no longer advantageous in these new environmental conditions.

The final and most worrisome criticism of the thrifty genotype hypothesis is that it promotes the concept of biological determinism, which may negatively influence public health policy towards populations being subjected to the burden of type 2 diabetes. The concept of biological determinism oversimplifies the complex etiology of genetics and socio-cultural factors such as poverty and lifestyle (McDermott 1998). Another hazard noted by McDermott (1998) is that in research “genes” is often used as a proxy for “race” as a biological entity which can limit the research that is focused on disease prevention and result in policy makers and researchers ignoring the social factors such as socioeconomic status, history, and culture.

Another critic, Marks (2002) argues persuasively that genetics and beliefs about heredity have long been used as excuses to ignore the objectionable conditions of the powerless as well as to justify their exploitation. Scientists’ findings are viewed by society as authoritative statements which whether right or wrong can be used to create profit as well as influence public policy and the society as a whole as they become “folk knowledge” (Marks 2002). Consequently, Marks (2002) contends that scientists pursuing genetic and evolutionary research such as the thrifty genotype hypothesis should take responsibility for making these authoritative statements based on their research findings.
Scientists have a responsibility to be critical of their research and to quickly repudiate false scientific research. This responsibility also includes an awareness of the consequences that inaccurate scientific research have for the general public (Marks 2002).

Thrifty Phenotype Hypothesis

Proponents of the thrifty phenotype hypothesis argue that environmental factors, specifically poor fetal and infant malnutrition, produces permanent modifications in glucose-insulin metabolism that are the primary cause for the onset of type 2 diabetes and the metabolic syndrome in adulthood (Barker et al. 1993). The thrifty phenotype hypothesis is based on the concept advanced by the fetal origins of adult disease hypothesis that fetal programming “induced by a transient stimulus, causes permanent alterations in structure and function of the organism at the cellular, organ and whole-body levels, which can continue to act after birth” (Forrester 2004:212). Over the last decade, the supporters of the fetal origins adult disease hypothesis have focused on the association between fetal programming and the development of CVD, hypertension, and type 2 diabetes in adulthood (Barker 1999).

The relationship between fetal growth and the pathogenesis of type 2 diabetes proposed by the thrifty phenotype hypothesis has been tested in several populations including Native American populations (Benyshek 2005). The results have shown that poor fetal growth and low birth weight has a relationship with metabolic syndrome diseases though the strength of association has varied from one study to another (Lindsay
and Bennett 2001). As a result of these findings, researchers now include type 2 diabetes antecedents such as insulin resistance and reduced insulin secretion as conditions associated with malnutrition in childhood (Hales and Barker 2001).

Although the proponents of the thrifty phenotype hypothesis acknowledge that birth weight and poor fetal growth have a genetic component, they assert that environmental factors are the main cause for the development of type 2 diabetes. Most cases of fetal malnutrition world-wide are caused by maternal malnutrition. Hales and Barker (2001) argue that poor fetal nutrition leads to poor development and function of pancreatic β-cell mass which is linked to the onset of type 2 diabetes and insulin resistance. Fetal malnutrition has a negative impact on growth of organs which leads to permanent alterations to body structure and function. When individuals subjected to fetal and infant malnutrition experience over-nutrition as children and adults along with factors such as obesity, aging, and physical activity exist, the glucose-insulin metabolic dysfunction is triggered (Hales and Barker 2001).

Individuals with fetal and infant malnutrition who later develop type 2 diabetes experience rapid weight gain and height growth from 7 years onwards. They are also above the average for weight and body mass index (BMI) at 15 years of age which means that they are overweight and/or obese and at risk for the onset of type 2 diabetes. Additionally, Hales and Barker (2001) argue that poor fetal growth causes the reduction of the number of cells in the endocrine pancreas and the metabolic demand on these limited cells which may explain the adverse effect of the rapid weight gain. Accelerated
weight gain in children can occur after a short period of famine or when a high fat and simple carbohydrate diet is adopted in rapidly modernizing countries such as those suffering high type 2 diabetes rates.

Maternal malnutrition which usually results in poor fetal nutrition and growth combined with the thrifty genotype may be the primary trigger of the onset of type 2 diabetes and the metabolic syndrome in adulthood. High rates of low birth weight babies (<2500 grams) are an indicator of poor maternal nutrition and a lack of prenatal care. In the Caribbean, low birth weight babies account for 14 percent of all babies born; this is almost as high as of Sub-Saharan African (UNICEF 2004). The poorest Caribbean nations like Haiti report the highest low birth weight babies and infant mortality rates. Given the high rates of low birth weight babies in many Caribbean nations, the thrifty phenotype hypothesis should be further examined as an explanation of the high prevalence of type 2 diabetes among Afro-Caribbean populations.

Other researchers hypothesize that the association between low birth weight (<2500 g) and type 2 diabetes may be caused primarily by genetic makeup rather than by prenatal environmental insults (Lindsay and Bennett 2001; Hattersley 1999). The proponents of a strong genetic relationship between low birth weight (<2500 g) and the onset of type 2 diabetes argue that the mutation of the glucokinase gene in the fetus, one of the main events that occurs in the maturity onset diabetes of the young (MODY), is also associated with low birth weight and the adult onset of type 2 diabetes. In utero, insulin is the primary promoter of growth so any genes that cause insulin secretion or
insulin resistance would likely influence fetal growth as well as the onset of type 2 diabetes in adulthood.

To investigate the influence of genetics on the association between low birth weight and type 2 diabetes, Lindsay and Bennett (2001) studied the Pima Indians of southern Arizona. They found that in the Pima Indians, low and high birth weight were both associated with the increased risk for type 2 diabetes in adulthood (Lindsay and Bennett 2002; McCance et al. 1994). They also discovered that gestational diabetes mellitus (GDM) in pregnancy influences high birth weight and heightened the risk of the onset of type 2 diabetes as an adult (Lindsay and Bennett 2002; McCance et al. 1994). However, the researchers discovered that six percent of the type 2 diabetes cases in individuals, 20 to 39 years of age, could be associated with low birth weight with a similar percentage associated to high birth weight (McCance et al. 1994). These results led Lindsay and Bennett (2001) to concur with the earlier conclusion of McCance and colleagues (1994) that the high prevalence of type 2 diabetes found in the Pima Indians could not “reasonably” be associated with fetal or infant nutritional deficiencies.

As an alternative to the thrifty genotype and thrifty phenotype hypotheses, Lindsay and Bennett (2001) and McCance and colleagues (1994) suggested that the association found between low birth weight and type 2 diabetes in the Pima Indians may reflect a selective survival of low weight infants who are genetically predisposed to metabolic characteristics that result in the onset of type 2 diabetes in adulthood. McCance and colleagues (1994) also note that insulin resistance was an important antecedent for
type 2 diabetes in Pima Indians. And they suggest that it was the genetic predisposition to insulin resistance that facilitated this selective survival advantage; and over several generations it led to a high prevalence of diabetes and insulin resistance in contemporary populations.

Additionally, Lindsay and Bennett (2001) examined if there was a genetic relationship between low birth weight and parental diabetes. Studying parental diabetes would provide valuable data. Because if the low birth weight is associated with the onset of type 2 diabetes, then parents of low birth weight infants should be a higher risk for type 2 diabetes. In the Pima Indians, the researchers found that low birth weight was associated with parental type 2 diabetes, but specifically paternal type 2 diabetes. The fathers of low birth weight babies have a higher risk of developing type 2 diabetes than do their offspring (Lindsay and Bennett 2000). Since it is unlikely that the fathers and offspring have experienced similar in utero and infant environmental factors, the researchers sought another hypothesis to explain this association. They proposed that the genomic imprinting from fathers may be a major determinant in the relationship between low birth weight and type 2 diabetes in adults (Lindsay et al. 2000). The importance of paternal DNA in influencing fetal birth weight and growth was also found in a British study where paternal birth weight and height had a strong independent association with offspring birth weight, length and placental weight (Godfrey and Barker 1997).

In contrast, Frayling and Hattersley (2001) argue that the association between altered fetal growth and type 2 diabetes is the thrifty genotype expressing itself as the
thrifty phenotype. Low birth weight and type 2 diabetes are the phenotypes of the same insulin resistance genotype. In this “fetal insulin” hypothesis, there are two basic assumptions; 1) genetics play an important role in low birth weight and type 2 diabetes, and 2) the genes that influence the reduction of insulin secretion or increase insulin resistance predispose the birth of low weight babies as well as the onset of type 2 diabetes. Frayling and Hattersley (2001) accept that environmental factors such as poor fetal and infant nutrition may be working in concert with these genes to influence insulin resistance to differing degrees in individuals. Although the criticisms of the thrifty genotype and thrifty phenotype hypotheses are valid, these hypotheses provide valuable frameworks for researchers studying the pathogenesis of type 2 diabetes.

*Microevolution and the English-speaking Caribbean*

The population genetics of Afro-Caribbean peoples have undergone microevolution i.e., small scale changes of allele frequencies to the evolution processes of mutation, gene flow (migration/admixture), natural selection, and genetic drift. The impact of natural selection, gene flow (migration), and genetic drift on the genetics and biological conditions of primarily English-speaking Afro-Caribbean populations will be now discussed.

Contemporary Afro-Caribbean populations are descended primarily from genetically diverse African populations. Initially, African peoples were enslaved in West Africa, but as the demand increased slavers ranged south to enslave peoples in areas now known as Congo and Angola, and as far southeast as Mozambique (Curtin 1969; Thomas
1997). Thomas (1997) estimated that approximately 62 percent (~8 million) of the enslaved Africans brought to the Americas were from West Africa, followed by approximately 30 percent (~4 million) enslaved Africans from West-Central Africa and approximately 8 percent (~1 million) enslaved Africans from Southeast Africa. Similarly, Curtin (1969) estimated that during the peak of the Atlantic slave trade (1700 to 1800) 58.9 percent of the enslaved Africans were brought to the Americas from West Africa. Consistent with the history literature, Salas and colleagues (2004) found that the mitochondrial DNA of 481 individuals of African ancestry in the North and Central America showed links to western and west-central Africa.

Contemporary Afro-Caribbean populations have undergone an admixture with Europeans and Amerindians to varying degrees. Unfortunately, there has been little research on the population genetics of English-speaking Afro-Caribbean populations. Torres, Kittles, and Stone (2007) recently conducted a study of the genetic-make up of 314 individuals of African descent in the English-speaking Caribbean nations of Dominica, Grenada, Jamaica, St. Kitts, St. Lucia, St. Thomas, St. Vincent and Trinidad. Torres, Kittles, and Stone (2007) analyzed their study participants’ mitochondrial DNA and the Y chromosome and found that the Y chromosome indicated that the study participants had 72.6 percent African ancestry. Torres, Kittles, and Stone (2007) also found that European men most likely contributed up to 30 percent of the non-African markers on the Y chromosome of these Afro-Caribbean individuals in the English-speaking Caribbean. With the exception of Dominica where there was reduced genetic
diversity and 28 percent of study participants had Amerindian mitochondrial haplogroups, Torres, Kittles, and Stone (2007) found that there were low frequencies of Amerindian (5.4 percent) or Eurasian (3.5 percent) mitochondrial haplogroups.

Analysis of the mitochondrial DNA indicated that the majority of the sample belonged to haplogroup L3 which is distributed throughout Africa. These study participants had a high degree of genetic variation similar to their African ancestors. Torres, Kittles, and Stone (2007) suggested that this high degree of genetic variation was not only caused by admixture with Amerindian and Europeans, but by admixture among diverse African populations after arriving in the Caribbean. However, the mitochondrial DNA and the Y chromosome showed that while most of the variation was within the countries sampled, a small portion of significant variation occurred among the populations in the sample which Torres, Kittles, and Stone (2007) attributed to genetic drift.

Miljkovic-Gacic, Ferrell, and Patrick (2005) used autosomal allele markers to determine that 220 Afro-Caribbean men in Tobago derived 94 percent of their genetics from West African ancestors and had low levels of admixture from Europeans (4.6 percent) and Amerindians (1.4 percent). Using autosomal allele markers, Parra (1998) found there was similar low European admixture (6.8 percent) in Afro-Caribbean study participants in Jamaica with European men contributing more than European women.

The findings of these studies about the admixture of Afro-Caribbean populations are consistent with the historical literature on the changing demographics of the
Caribbean after the arrival of the Europeans. The low frequencies of Amerindian mitochondrial haplogroups reflect the decimation of Amerindian populations in these islands soon after the Europeans arrived in the Caribbean (Rouse 1993). The contribution of European men to the non-African markers on the Y chromosome of Afro-Caribbean populations is consistent with the migration of high numbers of European males to the Caribbean as well as the unequal gender relationships during slavery and colonialism (Rouse 1993). This admixture of European and African genes indicate gene flow acting through forced migration of Afro-Caribbean populations. Additionally, genetic drift is likely to have acted on some enslaved African populations that were relatively isolated (Madrigal et al. 2001; Torres, Kittles, and Stone 2007). However, more research needs to be conducted before a consensus can be reached about the genetic admixture of Afro-Caribbean populations in the English-speaking Caribbean.

Infectious diseases as selective forces, along with gene flow and genetic drift, are mechanisms of evolution that have influenced the population genetics of Afro-Caribbean peoples (Madrigal 2006). Malaria is the primary selective force on the genetics of Afro-Caribbean populations (Madrigal 1996). Caribbean populations reside in an ecological environment that allows the mosquitoes of the Anopheles genus to thrive. Malaria is caused by the protozoa transmitted from the bite of a female mosquito of 30 to 50 species of the Anopheles genus (Centers of Disease Control and Prevention 2008). Human beings can be infected by four species of malaria: Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale and Plasmodium malariae. Plasmodium falciparum is the most deadly
species of malaria and causes the most human infections along with *Plasmodium vivax*. Malaria is transmitted to humans in tropical and subtropical areas where the mosquitoes of the *Anopheles* genus and the protozoa can complete its growth cycle. The regions with the highest mortality and morbidity from malaria are Central America, northern and central areas of South America, Mediterranean, Middle East, Caribbean, West and Sub-Saharan Africa, and Southeast Asia (Centers of Disease Control and Prevention 2009).

Individuals possessing heterozygous abnormal hemoglobin (HbS) can resist infection from the deadliest form of malaria, *Plasmodium falciparum* which is likely to be fatal in individuals with normal homozygous hemoglobin (HbA) (Madrigal 2006). Deadly malaria epidemics swept through the Caribbean decimating Amerindian and European populations. Individuals possessing the heterozygous HbS allele are more likely to survive malaria than individuals with the homozygous HbA allele (Madrigal 2006). Populations of West and West-Central Africa have higher frequencies of heterozygous HbS allele than other populations in Africa (Madrigal 1996). Therefore, despite the high mortality from other malaria strains and others diseases like yellow fever and small pox, the enslaved Africans possessing the HbS allele were more likely to survive and reproduce in the Caribbean and Central America (Crawford 1983).

This examination of evolutionary forces of gene flow, natural selection, and genetic drift indicate that microevolution occurred in enslaved African populations after their arrival in the Caribbean. Genetic admixture, malaria, and isolation in some minor
instances have caused these populations to undergo allele frequency changes which have resulted in Caribbean populations with varying degrees of genetic diversity.

_Epidemiological Transition Theory_

In his seminal work published in 1971, Omran proposed the epidemiological transition theory to explain “the complex change in patterns of health and disease and on the interaction between these patterns and their demographic, economic and sociologic determinants and consequences.” The discipline of demography has had several concepts that explained population dynamics. Omran’s epidemiological transition theory, however, sought to apply an epidemiological understanding of the etiology of disease mortality and morbidity patterns to population changes. Using data based on the European experience, Omran (1971) contended that the epidemiological transition had 3 primary stages:

1. The age of pestilence and famine characterized by an increase in infectious diseases such as malaria, small pox and malnutrition about 10,000 years ago with the advent of agriculture.

2. The age of receding pandemics which occurred in the late 19th to 20th century when diseases such as influenza and the black plague receded. Omran posits that the cause for the receding pandemics was not medical advances, but rather the result of improved sanitation in cities in particular, hygiene and nutrition.

3. The age of degenerative and man-made disease characterized by an increase in degenerative diseases such as cancers and heart disease as well as the re-
occurrence of more virulent strains of infectious diseases such as tuberculosis and HIV/AIDS in the late 20th century.

In 1986, Olshansky and Ault added a fourth stage to the epidemiological transition the “age of delayed degenerative diseases.” In this fourth stage, individuals live longer so these chronic degenerative diseases cause morbidity and mortality at the later stages of life.

Omran (1971) argued that societies undergo the epidemiological transition in different stages. For industrialized countries, the final stage of the epidemiological transition began at the end of the 20th Century with the increase in delayed degenerative diseases such as osteoporosis, prostate cancer, hypertension, and type 2 diabetes along with the renewed threat of infectious diseases such as HIV/AIDS and tuberculosis. Omran (1971) also posited that self-degenerative diseases are the primary cause of mortality in modern industrialized countries because improved nutrition and health care have increased life expectancy.

Critics of the epidemiological transition theory have made persuasive arguments that it is primarily a western/European model which fails to consider “the global nature and the historical sequence of mortality transition as it spread” (Caldwell 2001:1). The epidemiological transition theory underestimates the global reach of ideas, medical technological advances, cultural practices that suggest that there are many epidemiological transition models that vary from society to society.
Critics also argued that the epidemiological transition theory disregards differential mortality and health disparities among various sub-groups in a population (Gaylin and Kates 1997). Marginalized groups such as the poor, women, and ethnic minorities have limited or no access whatsoever to regular health care and therefore, suffer from these diseases in higher frequency. For example, in the United States, African Americans have consistently higher mortality rates in most mortality categories. The infant mortality rate of African Americans continues to be twice that as the rate for non-Hispanic whites (Centers for Disease Control and Prevention 2007). Similar health disparities can be found in the Caribbean populations. For example, Gulliford and Mahabir (1998:143) found that type 2 diabetes morbidity has a high association with "lower education attainment, absence of pipe-borne water supply in the home and non-employment at ages 15 - 59" in Trinidad and Tobago. Consequently, marginalized population sub-groups tend to have higher morbidity for most infectious and chronic diseases as well as higher mortality rates around the world.

The epidemiological transition theory also presumes a level of control of infectious disease in populations that belies the reality. Recent health data strongly implies that infectious diseases have been increasing globally even in industrialized countries (Murray and Lopez 1996). Virulent diseases such AIDS and antibiotic-resistant tuberculosis have been on a steep upward trajectory in the United States, especially among African Americans and Hispanics (National Institute of Allergy and Infectious Diseases 2009). Additionally, there have been localized disease epidemics such as
hepatitis, whooping cough, measles, and Lyme disease in the United States (Gaylin and Kates 1997). In many developing countries, diarrhea, cholera, dengue fever, and malaria continue to be major public health problems. Additionally, chronic degenerative diseases such as type 2 diabetes and hypertension and new virulent diseases such as HIV/AIDS also persist in developing nations (Caribbean Epidemiology Centre 2008).

Gage (2005) argues that the epidemiological transition only has two stages and that world is actually in the second stage with exception of the increase in mortality from malignant neoplasms which he links to smoking and lung cancer. Gage contends that degenerative diseases began to decrease before 1940 and that previous data suggesting the increase in these diseases was due to improved mortality data collection and not the actual worsening of health outcomes. Gage bases his argument on the findings of research conducted in Europe, primarily England and Sweden. He does not examine disparities in health between social classes and ethnic minorities which are found in more diverse industrialized societies. For example, it is the high infant mortality rate of African Americans (two times of non-Hispanic whites) that is responsible for the overall high infant mortality rate in the U.S. in contrast to other industrialized countries. However, he does acknowledge that morbidity is also an indicator of health and that it is possible that morbidity may increase even as mortality decreases. He notes that although morbidity for degenerative diseases decreased in the early 20th century, morbidity grew towards to the end of the century which he suggests was caused by improved medical treatment which enhanced survivorship.
Despite these criticisms, the epidemiological transition theory has had major implications for the field of public health because it provided a framework by which to develop broader public health strategies to combat diseases, thereby improving overall population health (Caldwell 2001).

_Epidemiological History of the Caribbean_

The Caribbean has undergone an epidemiological transition that has resulted in a shift from mortality and morbidity from infectious diseases to chronic diseases along with the emergence of virulent strains of infectious diseases. When Columbus arrived in the 15th century, the Caribbean was populated with Amerindian populations that lived in difficult environmental circumstance. They suffered to varying degrees of infectious diseases and nutrition deficiencies (Cook 1998; Rouse 1993). Demographers find it difficult to estimate the size of the Amerindian populations scattered through the islands. However, it is clear that there were large population concentrations, especially on the larger islands such as Puerto Rico, Cuba, and Jamaica (Watts 1991). The Taino (Arawaks) chiefdom in the Hispaniola was a complex socio-political society (Cook 1998; Watts 1990). Columbus found Trinidad to have many inhabitants with cultivated farms and many villages (Cook 1998). There is considerable debate about the size of the Taino population, but estimates range from 60,000 to approximately 1 million based on writings of other Europeans who visited and lived on the island (Rouse 1993; Wilson 1991).

The health of the Amerindians prior to Columbus’ arrival can be deduced from research conducted on similar populations in other geographic regions (Armelagos 1990).
Small populations that moved from island to island were less susceptible to epidemics, but suffered from a variety of infectious diseases and zoonoses such as salmonella, intestinal worms, and amoebic dysentery (Rouse 1993). Their diverse diets included gathered fruits and vegetables and protein from insects, fish, and iguana. In contrast, larger populations dependent on agriculture tended to be susceptible to epidemics as well as zoonoses (Cook 1998). They practiced agriculture (planting cassava, etc.) and domesticated animals such as dogs and agouti. Their diets were nutrient deficient and seasonal drought often led to malnutrition (Rouse 1993).

Approximately 50 years after Columbus’ arrival the Amerindians became virtually extinct in the Caribbean. The role of the cruelty of the Europeans invaders in the extinction of Amerindians should not be understated. After being conquered by the Europeans, the Amerindians were enslaved and forced to work in mines and on plantations as well as being subjected to rape, torture, and other barbaric practices (Rouse 1993). The diaries of Bartolomé de las Casas, a Jesuit priest suggested that the Amerindians had suffered a cultural and social disintegration due to the horrors of European oppression and exploitation (Cook 1998).

Yet the influx of new diseases brought by the Europeans also contributed significantly to the demise of Amerindian peoples who also suffered from malnutrition after being forced to give their food to European settlers (Rouse 1993). Diseases such as swine influenza, malaria, small pox, measles, cholera, typhus, and yellow fever caused high mortality among Amerindians (Cook 1998). In the Caribbean, these diseases ran
swiftly through this mobile population killing thousands of Amerindians, some before they had even seen an European. The first small pox epidemics devastated Amerindian populations that had never before been exposed to the pathogen (Cook 1998). Today there are few Amerindians remaining in both non-Spanish and Spanish speaking Caribbean.

After Amerindian populations were decimated, Europeans enslaved a variety of African peoples from different ethnic groups and brought them to the Caribbean as well as the Americas to work on plantations (Wolf 1982). For enslaved African peoples, there was a high rate of mortality before, during, and after the transatlantic voyage due to diseases such as malaria, cholera, lead poisoning and other illnesses related to nutrition deficiencies (Wilson and Grim 1991). The Europeans brought new pathogens with them from West Africa on the slave ships as well as from livestock from Europe, contaminated water, and food that spoiled in the heat (Cook 1998: Kiple and Higgins 1991).

The introduction of malaria to the Caribbean by European slave ships proved deadly for Amerindian populations (Kiple 1988). Europeans observed that enslaved Africans adapted well to the tropical Caribbean environment (Kiple 1988). Yellow fever has also played an important role in the epidemiological and colonial history of the Caribbean and its origin has been controversial. Kiple (2001) argues that yellow fever along with its primary vector, the Aedes aegypti mosquito was brought to the Caribbean by Europeans from West Africa and that “Blacks” have a genetic immunity to the disease. In rebuttal, Watts (2001) responded that Mayan documents showed that yellow
fever was already present in the Americas when the Europeans arrived. Watts (2001) also rejects Kiple’s use of the term “Blacks” to describe ethnically diverse Africans. Watts (2001) points to the extensive work of Monath (1991) in the area of tropical diseases to support his contention that peoples of African descent do not have a genetic immunity to yellow fever. However, Kiple’s position about the origin of the disease is supported by the phylogenetic analysis of flaviviruses (Gaunt et al. 2001; Lepiniec et al. 1994) which strongly suggests that yellow fever along with its primary vector, the *Aedes aegypti* mosquito (Tabachnick 1991) has an African origin. Regardless of the origin of yellow fever, the impact of the disease on the Europeans who migrated to the Caribbean along with the Amerindians and the enslaved Africans was significant.

While previous exposure to these diseases may have provided enslaved Africans with some resistance, yellow fever and malaria epidemics struck the European colonies throughout the Caribbean over centuries devastating their populations (Rouse 1993). Europeans and enslaved Africans were also subjected to diseases indigenous to the Caribbean and Latin America such as Chagas disease and syphilis which were endemic to the region (Cook 1998). European colonists debilitated by disease (some diseases are still unidentified today), lacking medication and subjected to food shortages suffered malnutrition and starvation died in high numbers. Many Europeans returned to their home countries to escape the harsh environment of the Caribbean (Kiple and Higgins 1992).
After emancipation, large numbers of indigenous peoples from India were brought to the Caribbean to work on the sugar, cocoa, and coffee plantations (Williams 1970). Guyana and Trinidad and Tobago have the highest Indian populations in the Caribbean. Smaller groups of migrants from mainland China and Hong Kong as well as the Middle East also migrated to the Caribbean. While the health of Indians, Chinese and Middle East peoples has not been extensively documented, it is reasonable to conclude that they suffered from the same diseases and food shortages as the Africans and Europeans (Williams 1970).

Significant medical research findings led to the eradication of yellow fever and malaria in the Caribbean by the early 20th century. In 1881, Cuban scientist, Dr. Carlos Finlay identified the *Aedes aegypti* mosquito as the vector for yellow fever (Fraser 1992). In 1892, British bacteriologist, Ronald Ross’s research in India identified mosquitoes of the *Anopheles* as the vector responsible for the transmission of malaria (Fraser 1992). Colonial powers and their territorial governments in the Caribbean took steps to improve the health of their populations by introducing immunizations and other basic health care strategies such as improved sanitation and vector control (Fraser 1992). There were also pioneering physician researchers who undertook the task of ameliorating the health in their respective countries. George Giglioli, for example, has been credited as being the physician responsible for the eradication of malaria epidemics in Guyana (Fraser 1992). As a result of these medical advances and new public health policy, the rates of infectious diseases started to decline throughout the Caribbean (Williams 1970).
In 1950, the University Hospital of the West Indies was founded at the University of the West Indies campus in Jamaica. The hospital was and continues to be the site of clinical and pathological research on the variety diseases affecting Caribbean populations such as leptospirosis, scorpion poisoning, ackee poisoning, sickle cell anemia, malnutrition, hypertension, diabetes, and HIV/AIDS (Fraser 1992). As Caribbean colonies gained independence, their governments took steps to further advance the health of their citizens by funding more medical research at the University Hospital of the West Indies (Williams 1970). Governments also sponsored immunization and vector eradication programs, provided scholarships and other financial assistance for their citizens to train as physicians and nurses, built hospitals, and subsidized medication costs and other health facilities such as health clinics and pharmacies (Williams 1970).

Health and the English-speaking Caribbean

Today, the overall health of Caribbean populations has improved and since the mid-1990s, there has been a gradual decrease in mortality rates (Caribbean Epidemiology Centre 2005). Infant mortality rates have declined and the life expectancy of Caribbean populations has increased; women now live four to six years longer than men (Caribbean Epidemiology Centre 2005). Since the 1950s, the population of the Caribbean has doubled with an increase in the number of people over 60 years of age (Caribbean Epidemiology Centre 2005). This demographic shift has public health policy implications which involve crafting strategies to provide health care for the elderly suffering from chronic diseases such as type 2 diabetes, hypertension, and CVD (Caribbean
Epidemiology Centre 2005). Most Caribbean populations have become more urban which has led to overcrowding, insufficient housing, and inadequate water supply and sanitation. The poor living conditions along with socioeconomic factors such as poverty, unemployment, and the lack of education impact the quality of health of these populations (Caribbean Epidemiology Centre 2005).

To reiterate, Caribbean populations have been plagued by high mortality and morbidity rates from infectious diseases and nutrition related diseases (Kiple and Higgins 1992: Wilson and Grim 1991: Gulliford 1996). However, since the 1950s, this epidemiology pattern has changed with the increased prevalence of chronic non-communicable diseases (Fraser 2001: Hagley 1990). Today the leading causes of death in the English-speaking Caribbean populations are ischaemic heart disease, cerebrovascular disease, diabetes mellitus, malignant neoplasms, and injuries (traffic fatalities, suicides, and homicides are high among young people particularly young men) (Caribbean Epidemiology Centre 2007).

The mortality rates reported by the Caribbean Epidemiology Centre (CAREC) indicate that diabetes has become a serious public health problem across the English-speaking Caribbean. CAREC provides epidemiological surveillance and laboratory services to 21 Caribbean nations and is administered by the Pan American Health Organization (PAHO). CAREC reported that diabetes was the fourth leading cause of death in its member countries (excluding Grenada and the Dutch Caribbean) (Caribbean Epidemiology Centre 2007). During this period, heart disease, followed by cancer,
cerebrovascular diseases, and diabetes were the leading causes of death, but the estimated total numbers of diabetes-related deaths increased from around 10,000 to 16,000 (Caribbean Epidemiology Centre 2007). Women over 45 years of age accounted for 60 percent of diabetes-related deaths (Caribbean Epidemiology Centre 2002).

Nine years later (2004), CAREC reported that heart disease was still the leading cause of death, responsible for 15 percent of deaths, followed by cancers (11 percent), and diabetes (8 percent) in English-speaking Caribbean (Jamaican data not included) (Caribbean Epidemiology Centre 2007). For individuals over 45 years of age, ischaemic heart disease, followed by diabetes and cerebrovascular diseases were the leading causes of death (Caribbean Epidemiology Centre 2007). For Caribbean women, diabetes followed by ischaemic heart disease, cerebrovascular diseases, hypertensive diseases and HIV/AIDS were the leading causes of death (Caribbean Epidemiology Centre 2007).

Morbidity from these chronic degenerative diseases such as cardiovascular disease, type 2 diabetes, hypertension, obesity, and insulin resistance along with their sequelae, stroke, and amputations have also become major public health problems throughout the English-speaking Caribbean (Caribbean Epidemiology Centre 2005: Gulliford et al. 1998; Sargeant, Wilks and Forrester 2001).

The global diabetes epidemic impacts quality of life and has a heavy economic burden on individuals and their societies. The cost of diabetes in Latin American and the Caribbean has been calculated to be U.S. $65,216 million (Barcéo et al. 2003). These costs include indirect costs such as loss of productive life and permanent and temporary
disability. Direct costs associated with diabetes include prescribed medicines, consultations, hospitalizations and other treatment diabetes complications (Barcéo et al. 2003). Consequently, the treatment of diabetic patients in the Caribbean along with prevention has become the focus of international and local health officials. In 1996, the Declaration of the Americas on Diabetes (DOTA), a diabetes strategic plan for the Americas was established by the International Diabetes Foundation Federation and PAHO along with a coalition of diabetes-related public and private organizations to promote better health for people living with diabetes in the Americas (Declaration of the Americas on Diabetes 2004). In partnership with PAHO, DOTA has sponsored diabetes workshops throughout Latin America and the Caribbean.

As part of their Caribbean Diabetes Initiative, DOTA and PAHO sponsored a study to assess the quality of health care of diabetic patients in the English-speaking Caribbean by reviewing diabetic patient medical records in the clinics in the Bahamas and Jamaica and two hospitals in St. Lucia (2004). The DOTA/PAHO study (2004) found that only 19 percent of patients received eye exams and only 25.2 percent of patients had a foot examination overall (PAHO 2004). The majority of diabetic patients (64.2 percent) had poor glycemic control, 66.7 percent had high fasting glucose, 51 percent had blood pressure of 140/90 mmHg and over. Many of the records were incomplete missing data on smoking or alcohol use as well as physician notes. Height of patients were also missing from records in Bahamas and St. Lucia which meant that body mass index (BMI) could not be calculated (DOTA/PAHO 2004).
Despite the efforts made by Caribbean governments and public health officials to improve type 2 diabetes treatment, primary care for the disease did not meet international standards (DOTA/PAHO 2004). The Bahamas which had guidelines in place provided the most adequate diabetes care with positive outcomes. DOTA/PAHO (2004) recommended that Caribbean countries develop similar guidelines targeted to their at risk populations in order to improve and standardize type 2 diabetes care. Other recommendations include the training of health care professionals in diabetes care and periodic review of medical charts with health care practitioners to improve health data collection (DOTA/PAHO 2004).

Along with the increase in chronic non-communicable diseases, since the 1980s there has been an identifiable shift in mortality and morbidity rates from infectious diseases such as cholera and malaria to more virulent infectious diseases such as HIV/AIDS and tuberculosis in many Caribbean countries (Gulliford 1996; Hagley 1990). Immunization programs have proven to be successful in most of the Caribbean and infectious diseases such as measles, smallpox and polio have been virtually eliminated (Caribbean Epidemiology Centre 2005). However, these newer virulent infectious diseases such as HIV/AIDS and tuberculosis have no vaccinations and require expensive drugs and intensive medical care to be treated effectively.

Caribbean populations have high morbidity and mortality rates associated with HIV/AIDS (Caribbean Epidemiology Centre 2004; UNAIDS 2008). Only sub-Saharan Africa has higher HIV prevalence and incidence rates among adults than the Caribbean.
Although the United Nations Programme on HIV/AIDS (2008) reported that the HIV/AID epidemic in most Caribbean countries has stabilized, approximately 210,000 to 270,000 individuals were HIV+ in 2007. Almost three quarters of these individuals were Dominican and Haitian. In 2007, an additional 20,000 individuals in the Caribbean were infected with HIV and 14,000 individuals died from AIDS (UNAIDS 2008). These morbidity and mortality data show that HIV/AIDS is severe public health problem for Caribbean populations (Caribbean Epidemiology Centre 2004).

The governments of Bahamas and Bermuda have had some success in reducing the incidence of AIDS cases and mortality from AIDS over the last decade by implementing public health programs. These public awareness and education campaigns promote condom use, medical interventions to reduce mother to child transmission, and encourage HIV testing along with counseling and treatment (Camara et al. 2003). CAREC and the University of the West Indies have developed models which show that if other Caribbean governments do not successful prevent the disease’s spread, AIDS will become a major cause of death in the next 20 years with three to five percent of a country’s gross national product (GNP) being spent on treating AIDS patients (Caribbean Epidemiology Centre 2005).

After years of successfully containing the incidence of tuberculosis, the disease has re-merged in the modern Caribbean (Caribbean Epidemiology Centre 2008). In 2005, there was an increase of tuberculosis cases in Bahamas, Barbados, Belize, Guyana, Jamaica, Suriname, St. Vincent and the Grenadines, Trinidad and Tobago, St. Kitts and
Nevis, St. Lucia, and the Turks and Caicos Islands (Caribbean Epidemiology Centre 2008). The rise in tuberculosis prevalence in the Caribbean and globally has been in part attributed to the HIV/AIDS pandemic (Caribbean Epidemiology Centre 2009). However, CAREC has determined that the inattention and lack of funding for communicable disease prevention once they were “conquered” played a significant role in the disease’s re-emergence in the Caribbean.

Other infectious diseases that are prevalent in the Caribbean are malaria and dengue fever (Caribbean Epidemiology Centre 2008). Malaria is endemic in several Caribbean countries including Belize, the Dominican Republic, Guyana, Haiti, and Suriname. However, from 1980 to 2005, there have been periodic malaria outbreaks and clusters in the Bahamas and Trinidad and Tobago which had been considered “malaria-free” (Caribbean Epidemiology Centre 2008).

Dengue fever and dengue hemorrhagic fever (DHF) have become serious public health problems in the Caribbean. The *Aedes aegypti* mosquito is an efficient vector for the viral disease which has four closely related serotypes, all four serotypes have been identified in the Caribbean (Caribbean Epidemiology Centre 2008). While dengue fever presents itself as a typical viral infection which can be treated with complete bed rest, DHF is severe and can be fatal, particularly for young children under 10 and young adults. In 2002, Barbados, Suriname, and Trinidad and Tobago reported the highest number of DHF cases ever identified in the Caribbean (Caribbean Epidemiology Centre 2008). Based on analysis of dengue fever and DHF since 1980, CAREC is able to predict
with some accuracy when outbreaks would occur in specific countries: outbreaks occur every eight to 10 years lasting from two to three years. Since there is no vaccine for Dengue fever, public health officials in the Caribbean have focused on vector control and source reduction to control the disease (Caribbean Epidemiology Centre 2008).

The health of Caribbean populations appears to be in the fourth stage of the epidemiological transition. The leading causes of death are primarily chronic degenerative diseases. These diseases include ischemic heart disease, cerebrovascular disease, diabetes mellitus, and neoplasms, with specific sub-groups susceptible to communicable diseases such as HIV/AIDS and tuberculosis. The financial costs associated with HIV/AIDS as well as type 2 diabetes and other metabolic syndrome diseases and their sequelae have placed additional strain on the already limited budgets of low and middle-income Caribbean countries. These diseases are not only financial burdens, but they also inflict intense human suffering that impacts the “emotional well-being” and “quality of life” of a society. Investing in the prevention programs is, therefore, the most effective strategy for these countries to combat these diseases. To reduce mortality and morbidity rates from these diseases, public health officials need to develop prevention strategies involving public awareness campaigns, early detection programs involving screening of the appropriate at risk sub-groups, and clinical treatment of diabetic patients.
Health and English-speaking Caribbean Migrants

Since the 1950s, there has been a substantial migration of English-speaking Caribbean people to North America and Europe (United Nations 2005). The two largest groups of English-speaking Caribbean migrants can be found in the United Kingdom and the United States. In the United Kingdom, English-speaking Caribbean people of African descent compose one percent (565,876) of the total population which is 12.2 percent of the whole ethnic minority population (Office of National Statistics 2001). In the United States, the Caribbean population is 10.1 percent of the foreign born population (3,373,000) of the whole population (United States Census Bureau 2003). However, the United States Census Bureau numbers likely do not count the large number of illegal migrants from the English-speaking Caribbean residing the United States.

There is more extensive health data available on the English-speaking Caribbean population in the United Kingdom than its counterpart in the United States. In the United Kingdom, type 2 diabetes is five times more prevalent in the Afro-Caribbean and Asian populations than in other ethnic groups (Diabetes UK 2004). Overall, 17 percent of the Afro-Caribbean population has type 2 diabetes. This population is more likely to experience the onset of type 2 diabetes about 5 years earlier than the other ethnic groups with the exception of Asians (Diabetes UK 2004). Type 2 diabetes is twice as prevalent in Afro-Caribbean men as in British European men as and four times higher in Afro-Caribbean women than British European women (Chaturvedi, McKeigue and Marmot 1993).
Ischemic heart disease is one of the leading causes of death for the Afro-Caribbean population. However, the Afro-Caribbean population is at much lower risk (half) for ischemic heart disease than British Europeans (Chaturvedi 2003). The Afro-Caribbean population risk for stroke is 1.5 to 2.5 times higher than for British Europeans with women at higher risk than men, but they have better post-operative recovery than other ethnic groups which may be linked to their low rate of ischemic heart disease (Chaturvedi 2003).

There is limited specific health data on the Caribbean population in the United States. However, cross-cultural studies by Cooper and colleagues (1997) and Mbanya and colleagues (1999) found that Caribbean migrants to the U.S. and the U.K. had the highest type 2 diabetes prevalence compared to their compatriots residing in their home countries. The cross-cultural study by Mbanya and colleagues (1999) of people of African descent found the age-standardized type diabetes in rural (.8 percent) and urban (2 percent) Cameroon, followed by Jamaica (8.5 percent), with the highest rates in Afro-Caribbean migrants (14.6 percent), primarily Jamaican, residing in Manchester, United Kingdom. Mbanya and colleagues (1999) found no significant differences in the diabetes prevalence by gender. A cross-cultural study by Cooper and colleagues (1997), of people of African descent found the lowest prevalence of type 2 diabetes in Nigeria (2 percent), followed by the Caribbean (9 percent) with the highest prevalence in the U.S. and the U.K (11 percent). These findings suggest Caribbean migrants in the U.S. are at high risk
for the onset of type 2 diabetes and have a similar health status to African Americans and their counterparts in the U.K.

Type 2 diabetes along with other metabolic syndrome diseases such as obesity and hypertension have become serious health problems in the Unites States. Like in the United Kingdom, Caribbean migrants living in the United States are likely at elevated risk for the diseases such as type 2 diabetes, obesity and hypertension.

Apart from chronic diseases, the most prevalent infectious disease in the Afro-Caribbean population of the United Kingdom is HIV/AIDS. In 1994, the prevalence of AIDS in the Afro-Caribbean population was three times of the British European population in the United Kingdom (Low 2004). The HIV/AIDS incidence in the Afro-Caribbean population increased with HIV infection incidence tripling from 1997 to 2001 (Dougan et al. 2004). Individuals with HIV/AIDS contracted the disease in the United Kingdom as well as in the Caribbean. The prevalence is low among Afro-Caribbean heterosexuals with high prevalence among men who have sex with men (Dougan et al. 2004).

There is no data widely available on the rates of HIV/AIDS in the Caribbean population living in the United States. However, in 2000, New York City reported that Caribbean migrants made up 46 percent of all AIDS cases among migrants to the city (Caribbean Epidemiology Centre 2005). Given the high HIV seroprevalence rates in the Caribbean and the Caribbean population in the United Kingdom, it is reasonable to
conclude that the Caribbean population residing in the United States has similarly high rates.

**Type 2 Diabetes in the English-Speaking Caribbean**

The majority of the research on type 2 diabetes and other chronic diseases in the English-speaking Caribbean has been conducted in Barbados, Jamaica and Trinidad and Tobago because the University of the West Indies campuses as well as PAHO/WHO centers and divisions such as Caribbean Epidemiology Center (CAREC) and Caribbean Food and Nutrition Institute (CFNI) are located in these countries. Type 2 diabetes research in the English-speaking Caribbean has been funded through a variety of sources led by PAHO/WHO and UK research agencies and supported by the Ministries of Health in each country.

Modeled on the British National Service, all the countries in the English-speaking Caribbean provide their citizens with free or low cost point of service health care through government funded health centers and hospitals (Gulliford and Mahabir 2001; McCaw-Binns and Moody 2001; Pan American Health Organization 2001; Walrond 2001). To varying degrees each country also has a private health care which is comprised of private health insurance companies and privately owned hospitals and medical practices. Most of the type 2 diabetes research conducted in the English-speaking Caribbean has recruited participants through the government funded health centers and hospitals.

In the English-speaking Caribbean, women have a higher prevalence of type 2 diabetes, obesity and hypertension than men (Miller, Maude, and Beckles 1996; Foster et
al. 1993; Nemesure et al. 2007; Wilks et al. 1999). Type 2 diabetes prevalence in the English-speaking Caribbean has been associated with socioeconomic factors such as low income, low education attainment, family history, older age and living in rural areas (Gulliford, Mahabir and Rocke 2003; Wilks et al. 1999; Gulliford et al. 1997; Gulliford and Mahabir 1998). After hypertension (65.5 percent), type 2 diabetes (27.6 percent) is the second cause of end stage renal disease based on the analysis of data from six English-speaking Caribbean countries: Bahamas, Barbados, British Virgin Islands, Cayman Islands, Jamaica, and Trinidad and Tobago (Soyibo and Barton 2007).

One of the first and largest studies on the prevalence of type 2 diabetes in the English-speaking Caribbean was conducted with the support of the Ministry of Health in Trinidad. Poon-King and Henry (1968) sampled around 24,000 individuals and found a type 2 diabetes prevalence of approximately two percent. Women and individuals of East Indian descent had higher prevalence rates than other study participants. The high carbohydrate intake of the East Indian population was suggested as the cause of high type 2 diabetes prevalence rate. In this study, women diagnosed with type 2 diabetes were more likely to be over 40 years of age, have a family history of the disease, and be overweight (Poon-King and Henry 1968). Overall, the type 2 diabetes prevalence rate was higher in participants who lived in urban areas than those who lived in rural or agriculture areas.

By 1995, prevalence studies showed that approximately 11 to 13 percent of the adult population (> 35 years old) of Trinidad had been diagnosed with type 2 diabetes,
though there are estimates as high as 20 percent (Gulliford and Mahabir 1998; Miller, Maude, and Beckles 1996; Pan American Health Organization 2001). A study administering ADA risk assessment questionnaire to 317 individuals (68 percent women) in Trinidad found that 30 percent of respondents were at risk for the onset of type 2 diabetes with women at higher risk (17 percent) compared to men (13 percent) (Austin et al. 2004). Individuals of East Indian descent continue to have higher rates of type 2 diabetes than individuals of African descent (Gulliford and Mahabir 1998; Miller, Maude, and Beckles 1996).

In Trinidad, individuals diagnosed with type 2 diabetes were more likely to have lower incomes, low education attainment, be retired or disabled, be visually impaired, have long term health problems, and report poor overall health than the individuals without the disease (Gulliford, Mahabir and Rocke 2003). Individuals diagnosed with type 2 diabetes were less likely to have private health insurance coverage and more likely to utilize government funded health care centers and hospital clinics and to a lesser extent pay out-of-pocket for private physician services (Gulliford, Mahabir and Rocke 2003). Individuals with a longer duration of type 2 diabetes and older age were more likely to use the health services of a private physician (Gulliford and Mahabir 2001). Government health centers and hospital clinics provide free primary care and a limited number of pharmaceuticals, but patients complained of long waits, lack of continuity of care, inconvenient hours during work hours on weekdays), and poor physician behavior (Gulliford and Mahabir 2001; Phillips 1996) In contrast, private physicians were
available in the evenings and Saturdays and there were shorter waiting times to see the physician.

In a study of 2106 individuals, approximately 70 percent women diagnosed with type 2 diabetes were recruited at 35 government health centers in Trinidad (Gulliford and Mahabir 2002). This study found that 49 percent participants suffered from neuropathy, 12 percent had foot ulceration and four percent had lower limb amputations. Participants who had a longer duration of type 2 diabetes were more likely to have neuropathy and foot ulceration. Almost half of the participants with a medical history of foot ulceration had been admitted to the hospital for treatment. A medical history of foot ulceration was associated with lower-extremity amputations. Gulliford and Mahabir (2002) attributed the high prevalence of foot disease in the study population to poor food care practices which include inappropriate footwear, not wearing shoes when walking outside the home, and visually impaired participants cutting their own toenails.

A review of the medical records of 1447 diabetic individuals admitted to a government hospital in northern Trinidad over a 26 week period found that they were responsible for 13.6 hospital admissions and 23 percent of bed occupancy (Gulliford et al. 1995). Participants over 65 years of age and of East Indian descent had the highest admission rates. Foot disease and blood glucose problems were the causes of 52 percent of bed occupancies. Lower-extremity amputations were responsible for 4.5 percent of the admissions. Lower-extremity amputations and renal disease were associated with mortality (Gulliford et al. 1995).
In Barbados, the prevalence of type 2 diabetes was approximately 17 percent and hypertension was 35 percent (Foster et al. 1993; Nemesure et al. 2007; Nemesure et al. 2008). Women had a slightly higher prevalence of type 2 diabetes compared to men, but similar blood pressure prevalence to men. Eighteen percent of women had been diagnosed with type 2 diabetes and 15 percent of men had been diagnosed with the disease. Obese women and men were more likely to have been diagnosed with type 2 diabetes (Nemesure et al. 2007). Women who were obese were 5.2 times more likely to develop type 2 diabetes than men (Foster et al. 1993). Nemesure and colleagues (2007) sampled 4314 individuals in African descent over 40 years old in Barbados and found that 33.2 percent of women had a BMI of 30 compared to 11.5 percent men. Type 2 diabetes and hypertension were positively associated with obesity in women and men (Nemesure et al. 2007). Obese women were more likely to have low socioeconomic status and high parity.

The diabetes-related lower-extremity amputation rate in Barbados is among the highest globally (Hennis et al. 2004). Unlike in Trinidad, Barbadian women diagnosed with type 2 diabetes had higher lower-extremity amputation rates than men with type 2 diabetes (Gulliford and Mahabir 2002; Hennis et al. 2004). Hambleton and colleagues (2009) found that the mortality rates associated with diabetes-related lower-extremity in Barbados to be higher than in other studies conducted globally. Sepsis, followed by CVD, stroke, pneumonia, and renal disease were the causes of death associated with diabetes-related lower-extremity amputations (Hambleton et al. 2009). Inadequate footwear, poor
type 2 diabetes clinical primary care and insufficient post-amputation support services have been identified as factors that increased the risk of lower-extremity amputation (Hambleton et al. 2009; Hennis et al. 2004; Walrond and Ramesh 1998). Also, individuals diagnosed with type 2 diabetes had high rates of retinopathy and cataracts (Hennis et al. 2002; Hennis et al. 2001).

One of the earliest type 2 diabetes studies conducted in Jamaica surveyed 958 individuals over 14 years in a rural area. This study found that the incidence of the disease was seven percent (Tulloch and Johnson 1958). Approximately 15 years later, another study conducted by Du and colleagues (1972) found the prevalence of type 2 diabetes of eight percent in 537 individuals, 24 to 64 years of age, living in rural Jamaica. About 20 years after, studies estimated that the type 2 diabetes prevalence for adults ≥ 25 years and older in Jamaica was 12 to 16 percent (Cooper et al. 1997; Ragoobirsingh, Lewis-Fuller and Morrison 1995; Wilks et al. 1999; Wilks et al. 1995). Figueroa, Fox and Minor (1999) administered a lifestyle and behavior survey to 958 Jamaican individuals, 15 to 49 years of age, and found an overall four percent prevalence of type 2 diabetes of women (4.8 percent) having a higher prevalence than men (3.3 percent). Women and men over 40 years of age were more like to have been diagnosed with type 2 diabetes.

In one Jamaican prevalence study, Wilks and colleagues (1999) took anthropometric measurements, blood pressure and blood glucose tests from 1303 individuals (60 percent women) recruited from randomly selected household. The type 2 diabetes prevalence for the whole study population was 13.4 percent. Women had a
higher prevalence of type 2 diabetes (15.7 percent) compared to men (9.8 percent). Women were significantly more obese and had higher BMIs and waist and hip circumferences than men in the study. Individuals diagnosed with type 2 diabetes were more like to have a family history of the disease as well as hypertension (Wilks et al. 1999).

Jamaica also has a high prevalence of obesity and overweight. Ragoobir Singh and colleagues (2004) administered a cross-sectional survey and took anthropometric measurements of 2105 individuals (69 percent women) and found 23.8 percent of women were overweight and 17.6 percent of women were obese compared to 14.8 percent of men who were overweight and six percent of men who were obese. Participants with high waist-hip ratio had a higher prevalence of type 2 diabetes (Ragoobir Singh et al. 2004).

Given the high prevalence of type 2 diabetes and its associated risk factors described in the studies above, governments in the English-speaking Caribbean have focused on improving the delivery of primary care to individuals diagnosed with the disease. Inadequacies in primary care for type 2 diabetes were found in a study conducted in Barbados, Tortola (British Virgin Islands) and Trinidad and Tobago (Gulliford et al. 1996). This study reviewed the medical records of 1661 individuals diagnosed with type 2 diabetes receiving treatment at 17 government funded health centers and 17 private physician offices. The medical records showed 50 percent of participants had poor glycemic control with Trinidadian participants having the highest glucose levels (Gulliford et al. 1996). Participants receiving type 2 diabetes care from government
health centers were more likely to have poor glycemic control than those receiving care from private physicians. Examinations of the feet and eyes were not systematically recorded by health care practitioners. Analysis the height and weight data recorded showed that there was a high prevalence of obesity among the participants, particularly women (Gulliford et al. 1996). Medical records also revealed low percentages of dietary and lifestyle advice to participants. The findings of this study were presented to health practitioners in workshops in 10 English-speaking Caribbean countries (Gulliford et al. 1996).

In response to the inadequacies of primary care for type 2 diabetes in the English-speaking Caribbean, PAHO/WHO and the Caribbean Health Research Council used the findings of Gulliford and colleagues (1996) to develop clinical guidelines for health practitioners in “Managing Diabetes in Primary Care in the Caribbean” which was published in 1995 and revised in 2006. Since the implementation of these guidelines, type 2 diabetes research of primary care in Trinidad there has been improvement of type 2 diabetes primary care, but overall individuals diagnosed with type 2 diabetes attending government funded health care centers continue to have poor glycemic control (HbA1C ≤ 7.0 percent) (Apparico et al. 2007; Ezenwaka and Offiah 2001; Mahabir and Gulliford 2005).

In Trinidad, Ezenwaka and Offiah (2001) took anthropometric measurements, blood pressure and blood glucose tests of 191 individuals (~66 percent women) diagnosed with type 2 diabetes at government funded health care centers and found that
85 percent had poorly controlled glycemic control (HbA1C ≤ 7.0 percent). Another study in Trinidad by Mahabir and Gulliford (2005) found that primary care for type 2 diabetes and hypertension had improved over a 10 year period. Mahabir and Gulliford (2005) reviewed diabetic patients’ medical records at 23 government public health centers in 2003 and compared them to medical records reviewed in 1993. They also conducted a brief questionnaire with health care practitioners at the health centers. Overall, the medical records showed there was an increased testing of blood glucose, notations of dietary and physical activity advice and administering of prescribed medication for type 2 diabetes and hypertension. However, there is no indication that these improvements in primary care have resulted in positive outcomes in blood glucose levels and blood pressure from the data collected in 1993 (Mahabir and Gulliford 2005).

A more recent study conducted in Trinidad reviewing the medical records and taking blood glucose tests of 132 individuals (70 percent women) diagnosed with type 2 diabetes at 10 government public health centers, also found poor glycemic control (Apparico et al. 2007). The Apparico and colleagues (2007) study was conducted in poorer and more rural regions of north and central Trinidad compared to Mahabir and Gulliford (2005). Apparico and colleagues (2007) found that 55 percent of participants had poor glycemic control (HbA1C ≤ 7.0 percent). Participants who had a longer duration of type 2 diabetes and were older (51 to 70 years of age) were more likely to have poor glycemic control. In this study, ~60 percent of the participants in this study were of East Indian descent (Apparico et al. 2007). Apparico and colleagues (2007) noted
that the increased blood glucose testing using glucose monitors at government health centers did not meet the clinical guidelines which require the use of the FGT to measure blood glucose levels. Also, sometimes patients did not receive prescribed type 2 diabetes medication because it was not available at the health center and that there was a lack of dietary advice which may have contributed to poor glycemic outcomes (Apparico et al. 2007). Apparico and colleagues (2007) recommended a re-evaluation of primary care for type 2 diabetes at government health centers.

The findings of Mahabir and Gulliford (2005) and Apparico and colleagues (2007) indicate that despite an increased investment in the health care system by the Trinidad and Tobago government, primary care for type 2 diabetes at public health centers remain inadequate. After reviewing the medical records of 646 diabetic patients at eight government funded health centers in Trinidad and Tobago, Pinto Pereria and colleagues (2009) reached a similar conclusion that health care practitioners at government funded health centers did not adequately follow the guidelines in “Managing Diabetes in Primary Care in the Caribbean.” Pinto Pereria and colleagues (2009) suggested that these failures were due to the lack of dissemination or presentation of the guidelines to health practitioners, some of whom were unaware of them. Pinto Pereria and colleagues (2009) also recommend an annual assessment to identify barriers to health practitioners implementing the guidelines.

In addition to taking measures to improve primary care for type 2 diabetes, in 2003 the government of Trinidad and Tobago established the Chronic Disease Assistance
Plan (CDAP) (National Insurance Property Development Company Ltd. 2009). CDAP provides free prescription medicines to all individuals including children diagnosed with specific medical conditions that include type 2 diabetes, hypertension, CVD, depression, and Parkinson’s disease (National Insurance Property Development Company Ltd. 2009). CDAP accepts prescriptions for these medicines from public or private health care practitioners and dispenses medicines through private and public pharmacies. Individuals diagnosed with type 2 diabetes prescribed insulin can also receive a free glucometer and strips through CDAP.

Bobb and colleagues (2008) administered questionnaires and blood glucose tests to 208 participants (63 percent women) diagnosed with type 2 diabetes receiving prescribed hypoglycemic agents from CDAP alone. Bobb and colleagues (2008) found that approximately 62 percent of these participants had good glycemic control (HbA1C ≤ 7.0 percent). Participants with a longer duration of type 2 diabetes were more likely to have poor glycemic control. Bobb and colleagues (2008) reported that 73 percent of the participants and pharmacists interviewed stated that the inadequate supply of prescribed medicines was problematic for CDAP. The higher positive outcomes for participants who receive medicines through CDAP may be linked to the fact that they receive health care services through both the private and public sector. Therefore, participants in this study are most likely to be compliant to their drug regime.

Unlike in Trinidad, Jamaica’s private sector provides a high proportion (62 percent) of primary care. There are also costs associated with laboratory blood tests
ordered at government health care clinics (Wilks et al. 2001). Studies conducted in Jamaica also show negative outcomes for primary care of individual diagnosed with type diabetes in both the private and public health sector (Alleyne et al. 1997; Wilks et al. 2001). Wilks and colleagues (2001) reviewed the medical records of 437 individuals (75 percent) diagnosed with type 2 diabetes at two government funded health care centers and one privately owned health care center. Wilks and colleagues (2001) found that around 59 percent participants had poor glycemic control irrespective of whether they attended a government or private clinic. The medical records reviewed showed that blood glucose tests were not performed regularly and dietary and lifestyle advice as well as food and eye care were deficient at all clinics (Wilks et al. 2001).

This review shows that despite the establishment of guidelines and government investment, primary care for type 2 diabetes remains inadequate in the three wealthiest English-speaking countries, Barbados, Jamaica, and Trinidad and Tobago. Women, primarily of African descent, are more likely to be diagnosed with type 2 diabetes, obesity and high blood pressure and suffer from its sequelae such as visual impairment, foot disease, lower-extremity amputations to a higher degree than men. Overall, the prevalence of type 2 diabetes, obesity, and CVD continues to increase in the English-speaking Caribbean (Forrester 2003; Hennis and Fraser 2004). While it is difficult to calculate the costs of type 2 diabetes and other chronic diseases in the English-speaking, is it clear that governments and individuals struggle to cope with the financial and quality
care of life issues resulting from the high prevalence of these diseases (Cunningham-Myrie and Forrester 2008; Gulliford et al. 1995; Hennis and Fraser 2004).

**English-Speaking Caribbean Attitudes about Type 2 Diabetes**

Throughout the English-speaking Caribbean, type 2 diabetes is colloquially referred to as “sugar.” There is little research on the cultural beliefs and attitudes about type 2 diabetes and health in the English-speaking Caribbean. However, this literature shows that individuals diagnosed with type 2 diabetes have some awareness that dietary and lifestyle change can improve their management of the disease. Additionally, there is widespread use of traditional/alternative remedies to treat the disease. These studies also show the need for health care practitioners to stress the importance of physical activity and low sugar and fat diets to patients diagnosed with type 2 diabetes and other chronic diseases as well the need for public health type 2 diabetes awareness interventions in the English-speaking Caribbean.

In Trinidad, Johnson and Whetstone (2005) administered a questionnaire measured by the Diabetes Attitude Scale-3 (DAS-3) to 64 individuals diagnosed with type 2 diabetes, 70 percent women and 45 percent of African descent. Analysis of the data found that the respondents believed that health care practitioners needed to provide them with better advice about type 2 diabetes management, diet, and lifestyle. Women considered type 2 diabetes to be more serious than men (Johnson and Whetstone 2005). Johnson and Whetstone (2005) recommended that health care practitioners in Trinidad receive specialized training in type 2 diabetes care and management.
To determine the gender differences in compliance and attendance at two government hospital clinics, questionnaires were administered to 360 individuals (74 percent women) diagnosed with type 2 diabetes (Babwah et al. 2006). Women had lower education attainment (elementary school) and were more likely to be unemployed than men. Women were also more likely to be satisfied with clinic services, compliant taking prescribed medicines and follow dietary recommendations for type 2 diabetes (Babwah et al. 2006). Women were also less likely to smoke or consume alcohol than men. Men were more apt to use traditional/alternative medicines.

In the English-speaking Caribbean, individuals diagnosed with the disease are responsive to the instructions of their physician (Wint et al. 2006). In Jamaica, Wint and colleagues (2006) conducted open ended interviews with 133 participants (74 percent women) diagnosed with type 2 diabetes recruited from a government health clinic to determine their knowledge about the disease. The majority of participants (62.4 percent) reported that physicians were their primary source of type 2 diabetes information. Women scored higher than men on the knowledge test which showed that overall participants had an inadequate biomedical knowledge of type 2 diabetes (Wint et al. 2006). Higher knowledge scores were positively associated with time since diagnosis and level of education attainment. Among the participants, 47 percent did not understand the meaning of the word, “diabetes” and 18 percent believed that the disease was curable. In interviews, participants were more motivated to make lifestyle changes in response to their physician’s recommendations than from diabetes awareness programs or
experiencing complications from the disease. Wint and colleagues (2006) concluded that a collaborative effort towards treating type 2 diabetes with diabetes educators offering guidance to the patient as well as family members could improve diabetes management and outcomes.

Individuals diagnosed with type 2 diabetes in the English-speaking Caribbean are aware of the need to modify their diets and attempt to do so by consuming less fatty foods and more vegetables (Duff et al. 2006; Ragoobirsingh et al. 2006). In a cross-sectional survey, food frequency questionnaires were administered to 2105 participants (69 percent women) to determine the relationship between dietary intake and chronic diseases in Jamaica (Ragoobirsingh et al. 2006). Oranges were the most frequently consumed fruit. Ragoobirsingh and colleagues (2006) found that individuals diagnosed with type 2 diabetes were less likely to consume cheese and butter and more likely to consume carrots and callaloo (a soupy dish made from a green leaf vegetable from the Xanthosma species) than individuals not diagnosed with the disease (Ragoobirsingh et al. 2006). The researchers concluded that although study participants consumed large quantities of high starch carbohydrates and fatty foods, individuals diagnosed with type 2 diabetes and other chronic diseases lowered their consumption of these foods (Ragoobirsingh et al. 2006).

In another study conducted in Jamaica, Duffy and colleagues (2006) administered a structured interview to determine compliance of lifestyle practices to manage type 2 diabetes which was scored by a Likert scale to 133 individuals (74 percent women).
diagnosed with type 2 diabetes. Duffy and colleagues (2006) found that the most participants were overweight or obese and practiced inadequate self-care. Seventy-seven percent of participants had poor glucose control and high blood pressure and just 7 percent of participants used a glucometer monitor. Participants were more likely to keep clinic appointments and take care of their feet (Duffy et al. 2006). Only, 40 percent of women reported full compliance with prescribed medicines compared to 60 percent of men. Physical activity and weight control were also subpar. Forty-six percent of participants believed that diet and/overweight played a role in type 2 diabetes (Duffy et al. 2006). Eighty-five percent of participants had visited with a dietitian, 56.4 percent were on a “special diet,” and 21 percent took multivitamins. Approximately 16 percent did not consume sugar and sugar intake was associated with higher BMI and lower self-care scores (Duffy et al. 2006).

In the English-speaking Caribbean, studies show that there is a positive attitude about consuming fruits and vegetables and engaging in physical activity (Austin et al. 2004; Caribbean Food and Nutrition Institute 2003). However, individuals do not eat adequate amounts fruits and vegetables and do not engage in regular rigorous physical activity. The Caribbean Food and Nutrition Institute (CFNI), a division of the PAHO/WHO funded a study conducted in Belize, Jamaica, St. Kitts and Nevis and Trinidad and Tobago to analyze attitudes about diet and physical activity (Austin et al. 2004; Caribbean Food and Nutrition Institute 2003). This large study conducted seven to 10 focus groups with eight to 10 people in each country and administered questionnaires
to 4364 total participants. The study found that although most participants had a positive attitude about consuming fruits and vegetables, they were not consuming adequate amount, especially those in urban areas. Women were more likely to consume fruits and vegetables than men (Caribbean Food and Nutrition Institute 2003). The cost of fruits and vegetables was identified by participants as a reason that they did not consume more of these foods.

The Caribbean Food and Nutrition Institute (2003) study also found that men were more likely to engage in planned physical activity than women. Women cited a busy schedule, safety concerns, and being tired from work as reasons they did not engage in leisure physical activity (Caribbean Food and Nutrition Institute 2003). While most participants agreed that physical activity was important, they considered it “punishment.” In Trinidad, Austin and colleagues (2004) found that 317 individuals (68 percent women) responding to the ADA risk assessment questionnaire also had similar negative attitudes towards physical activity. Almost all participants stated that they had “no time” for physical activity and led a sedentary lifestyle, exercising less than 30 minutes per day.

Other studies have shown low levels of physical activity in the English-speaking Caribbean (Boyne et al. 2004; Duff et al. 2006; Prochaska et al. 2002). In Jamaica, individuals diagnosed with type 2 diabetes reported limited physical activity (< 3.5 hours per week) and a sedentary lifestyle (Duff et al. 2006). Prochaska and colleagues (2002) found that children in elementary and high school in Barbados had low physical activity
levels and sedentary behavior comparable to their counterpart in the U.S. Barbadian girls were less likely to engage physical activity than boys.

Research in the English-speaking Caribbean shows a wide spread cultural belief that the use of traditional/alternative remedies can effectively control type 2 diabetes (Delgoda et al. 2004; Johnson and Whetstone 2005; Lans 2006; Mahabir and Gulliford 1997; Moss and McDowell 2005; Wint et al. 2006). Delgoda and colleagues (2004) reported that approximately 80 percent of 743 participants used traditional/alternative remedies along with prescribed medicines to manage type 2 diabetes. Only 13 percent of participants told their physician about their use of these traditional/alternative remedies. Ninety-two percent of participants living in rural areas used these traditional/alternative remedies compared to 70 percent of participants living in urban areas. In another study conducted in Jamaica by Wint and colleagues (2006), 23 percent of 133 participants used traditional/alternative remedies such as cerasse (*Momordica charantia*) to treat type diabetes. A study conducted by Moss and McDowell (2005) in rural St. Vincent found that five out of six women participating in a focus group preferred to use traditional medicines to treat type 2 diabetes and their religious beliefs supported their use of alternative treatments.

Mahabir and Gulliford (1997) conducted in Trinidad in which 622 participants (418 women) were interviewed about their use of medicinal plants. The medicinal plants most frequently used to treat type 2 diabetes were caraili (*Momordica charantia*), *Aloe vera*, olive-bush, and seed-under-leaf. Participants with a high school education were less
likely to use “bush medicines” than participants with only an elementary education or no education. Use of medicinal plants did not increase with age and there was no significant difference between their use by men and women. Overall, 28 percent of Afro-Trinidadians, 26 percent of individuals of mixed ethnicity, and 22 percent of Indo-Trinidadians used traditional Caribbean medicines and remedies to treat type 2 diabetes. Participants diagnosed with type 2 diabetes who reported “burning or numbness” in their feet and who symptoms were “tiredness, weakness, giddiness or dizziness” were found to have significantly higher use of medicinal plants to treat the disease. A majority of the participants who used these remedies picked their own medicinal plants; the remaining participants got their medicinal plants from friends and relatives, and only a few used “bush medicine” shops or traditional healers.

This literature suggest that it is vital that English-speaking Caribbean governments embark on type 2 diabetes awareness and education campaigns through the media from which most participants gather their information (CFNI 2003). In addition, these studies show that health practitioners need to be aware that many of their patients are using traditional/alternative remedies to treat type 2 diabetes in the English-speaking Caribbean.

*Traditional Caribbean Diet and Nutrition*

Rising mortality and morbidity rates of chronic diseases in the English-speaking Caribbean have been associated with the traditional diet becoming less nutritionally dense and the increased consumption of fast food (Hagley 1993; Sharma et al. 2008).
Caribbean Food and Nutrition Institute (CFNI) created a database of the composition and nutritional values of traditional foods mostly in the English-speaking Caribbean (Samuda 1998; Samuda and Henry 2000). CFNI continues to conduct research to expand the database which currently has approximately 150 foods (Samuda and Henry 2003). CFNI has categorized the traditional Caribbean diet into FAO determined food groups as illustrated in Figure 1 below.

![Figure 1. English-speaking Caribbean Food Groups](image-url)
As a result of the shared history and environment across the English-speaking Caribbean most of the foods consumed are similar though their preparation and although frequency of consumption may vary from nation to nation (Samuda 1998). Only a minority of foods like ackee in Jamaica are specific to some countries. Diets in the English-speaking Caribbean have high starchy carbohydrates and high energy from fat content (Austin et al.; Caribbean Food and Nutrition Institute 2003; Sharma et al. 2008).

In Trinidad, Ezenwaka and Kalloo (2004) found that after consuming three high carbohydrate starchy staples, bread, rice and roti, individuals diagnosed with type 2 diabetes were most likely to have the highest glucose responses. Ramdath and colleagues (2004) found that the starchy tubers, dasheen and cassava are high glycemic index foods, while roti, potatoes, and white yams were intermediate glycemic index foods. However, the methods by which starchy tubers are prepared likely influenced their glycemic indices. Bahado-Singh and colleagues (2006) found that roasting or baking starchy tubers caused them to have higher glycemic indices, while boiling them resulted in a lower glycemic indices.

One recent study of the dietary patterns in Barbados analyzed food frequency questionnaires and food diaries collected from 49 study participants of African descent (Sharma et al. 2008). Sharma and colleagues (2008) found a high fat and sugar intake, low fiber, zinc and calcium intake, low iron intake for women, high iron intake for men in the study population compared to CFNI’s recommended daily allowances. Sharma and colleagues (2008) also found:
• Chicken, fish and rice dishes provided 25 percent of the overall energy intake.
• Chicken and fish dishes provided 26 percent of overall fat.
• Sweetened juices and drinks contributed over 40 percent of the sugar intake.
• Bread, cereal and rice dishes are the sources of 33 percent of dietary fiber.

Sharma and colleagues (2008) reported that the most frequently consumed food and drinks were sugar, oat bran and multigrain breads, rice and peas, bananas, evaporated milk, and white and sweet breads.

Sharma and colleagues (2008) suggested that nutritional intervention programs should recommend:

• Sugar free or diet drinks be substituted for sweetened drinks.
• Reduce intake of fried foods; steam, grill and stew fish and chicken instead of frying, do not pre-fry dishes.
• Remove chicken skin prior to cooking.
• Prepare rice and other dishes with less oil and fat.
• Increase consumption of vegetables, fruits, and beans.
• Replace white bread with whole wheat bread.
• Substitute roasted nuts for fried nuts.
• Healthy snack foods.

Ragoobirsingh and colleagues (2006) analyzed food frequency questionnaires administered to 2105 individuals (69 percent women) and found that the Jamaican diet is comprised of high starchy carbohydrates foods. Green bananas and wheat bread were the
most frequently consumed starchy foods, while cassava was the least frequently consumed starchy food. Chicken (89.2 percent) was the most frequently consumed meat, followed by beef (55.7 percent). Cheese, eggs and butter were consumed by 74 percent to 78 percent of the participants. The most frequently consumed vegetables were carrots, callaloo, pakchoi (a green leafy vegetable), and string beans (Ragoobirsingh et al. 2006).

In response to the varying dietary patterns in each Caribbean country, the Food and Agriculture Organization of the United Nations (2007) designed a manual to provide governments with assistance in developing food-based dietary guidelines using focus group research to gather dietary preferences in each country (FBDGs). Unfortunately, only four English-speaking Caribbean governments have developed FBDGs to improve the health status of their populations (Albert et al. 2007). More research is needed on the nutrition and food composition of diets of populations in the English-speaking Caribbean to design FBDGs.

Health and Migration: Acculturation and Weight Gain

There is limited data on the health of Afro-Caribbean migrants, however, a review of the literature on the health on Latino migrants is informative as they have undergone a similar migration experience and are at similar risk for type 2 diabetes. Latino migrants have lower all cause mortality rates that non-Latino whites despite having lower socioeconomic status (Abraído-Lanza et al. 1999; Sorlie et al. 1993). There have been two primary explanations for this paradox; 1) the lower mortality rates of Latinos are the result of migratory patterns, and 2) Latino migrants are healthier because they engage in
preventive behaviors and rely on social networks. The healthy migrant and “salmon bias” hypotheses attempt to explain the migratory patterns that result in Latinos being healthier than their non-Latino white counterparts. The healthy migrant hypothesis suggests that Latinos who migrate to the U.S. are healthier than individuals born in the U.S. The healthy migrant hypothesis also posits that recent Latino migrants are healthier than those who have lived in the U.S. for longer periods of time (Sorlie et al. 1993; Stephen et al. 1994). The “salmon bias” hypothesis proposes that after working for many years and/or when they become ill, Latinos return to their home countries so they can die with family and in familiar surroundings (Abraído-Lanza et al. 1999). Therefore, the Latinos who remain in the U.S. are healthier.

The healthy migrant and “salmon bias” hypotheses have been critiqued as inadequate explanation for the Latino mortality paradox (Abraído-Lanza et al. 1999). Abraído-Lanza and colleagues (1999) argued that the healthy migrant hypothesis does not explain the lower Latino mortality rates because U.S. born Latinos who have not migrated also have lower mortality than U.S. born non-Latino whites. Abraído-Lanza and colleagues (1999) also contend that the “salmon bias” hypothesis to be an inadequate explanation of lower Latino mortality rates after studying the mortality of Puerto Ricans and Cubans because they were less likely to experience the “salmon bias” effect. Although Puerto Ricans could return to their home country if they were ill or elderly, their deaths would be accounted for in national mortality data. For Cubans, returning to their home country was difficult and unlikely due to the political and socio-economic
situation. Abraído-Lanza and colleagues (1999) found that both Puerto Ricans and Cubans still had lower mortality rates than U.S. born Latinos and non-Latino whites. Consequently, the healthy migrant and “salmon bias” hypotheses could not explain the lower mortality found in Latino migrants so other factors must be at work.

In spite of the Latino mortality paradox, Latinos do not have low mortality rates for all diseases. While they have lower mortality rates for most cancers than non-Latino whites, Latinos have higher mortality rates of cervical, liver and stomach cancers, CVD, stroke, and type 2 diabetes (American Cancer Society 2009; Smith and Barnett 2005; Abraído-Lanza et al. 1999). Cervical, liver and stomach cancers are associated with infectious agents that are indigenous to developing countries from which Latinos migrate (American Cancer Society 2009). The leading causes of death for Latinos are CVD, stroke and type 2 diabetes. There is also differences of mortality within Latino subgroups, for example, Mexican-Americans and Puerto Ricans are twice as more likely to die from diabetes-related mortality than Cuban Americans (Smith and Barnett 2005). Latinos also have higher prevalence of chronic diseases including obesity, particularly Latinas than non-Latino whites (Pan et al. 2009).

The alternative explanation for the Latino mortality paradox proposes that Latinos engage in preventative behaviors e.g. Latinos are less likely to smoke or consume alcohol than non-Latino whites (Abraído-Lanza, Chao and Flórez 2005). Yet chronic diseases such as type 2 diabetes and obesity that plague Latinos are highly associated with lifestyle behaviors, specifically poor diet. Researchers have sought to understand how
acculturation to their host country impacts the health status and health related behaviors of Latinos. Most of this literature has focused on the relationship between acculturation and health indicators such as diet and weight gain (Ayala, Baquero, and Klinger 2008; Lara et al. 2005). These studies have been conducted primarily with Mexican-Americans in the southwest. However, this research with Puerto Rican and Cubans has increased steadily. Studies have found both positive and negative effects of acculturation and migration.

Studies have found that the diets of Latinos become less healthy and their health status declined as they become more acculturated and their incomes increased (Yeh et al. 2009; Pérez-Escamilla and Putnik 2007; Himmelgreen et al. 2004). Other studies found that the more acculturated Latinos become, the more likely they were to have access to health care and preventative care such as breast and cervical cancer screening (Pergallo, Fox, and Alba 2000; Elder et al. 1991; Marks, Garcia, and Solis 1990).

Critics of acculturation and health studies among Latinos have argued that the measures used for acculturation are inconsistent and that confounding factors such as age have not been addressed adequately (Pérez-Escamilla 2009; Hunt, Schneider, and Comer 2004; Lara et al. 2005). Additionally, the emphasis on acculturation as the primary explanation for migrant health status overlooks the socioeconomic, socio-political, and historical context in which migrant health exists (Rogler, Cortes, and Malgady 1991; Viruell-Fuentes 2007). Viruell-Fuentes (2007) argued that acculturation studies inadvertently lead to blaming migrants and their culture for health disparities.
Understanding the health experiences of Latino migrants provides insight into how migration has impacted the health of Afro-Caribbean migrants in the U.S.

Migration and Identity: Afro-Caribbean Migrants in the U.S.

Although there have been few studies conducted on the health of Caribbean migrants in the U.S., the literature suggests that they have high infant mortality rates, high HIV/AIDS prevalence, and limited access to health services among the elderly women (65 years and older) due to low incomes (Baker 2004; Bayne-Smith et al. 2004; Spooner, Daniel and Mahoney 2004).

Nazroo and colleagues (2007) using survey data found that eight percent of Afro-Caribbean migrants in the U.S. self-reported type diabetes diagnoses. Afro-Caribbean migrants in the U.K have a type 2 diabetes prevalence of nine percent, while African Americans have a type 2 diabetes prevalence of 11 percent. Overall, Afro-Caribbean migrants in the U.S. self-reported the same CVD and type 2 diabetes percentage as European Americans (31 percent) which was less that African Americans (37 percent) and Afro-Caribbean migrants in the U.K (38 percent). Hypertension was also problematic for Afro-Caribbean migrants in the U.S. (27 percent), but this was lower than in Afro-Caribbean migrants in the U.K (30 percent) and African Americans (33 percent) (Nazroo and colleagues 2007).

Degazon and Parker (2007) examined the coping and psychosocial adaptation to managing type 2 diabetes of 212 (67 percent women) southern-born blacks and migrants from Barbados, Haiti, Jamaica and Trinidad and Tobago in the northeast U.S. Degazon
and Parker (2007) found that participants from Haiti and Jamaica had better coping strategies and were more motivated to manage type 2 diabetes than Barbadian participants. One recent study found that Afro-Caribbean migrants self-reported less tobacco use and had a more positive mental health status compared to African Americans (Keane et al. 2009).

Approximately, 3,000,000 people born in the Caribbean reside in the United States (U.S. Census Bureau 2000). The migration of Caribbean people to the U.S. should be viewed through the lens of capitalism as practiced in the 21st century. Labor migrations occur when individuals move from their countries of origin to seek out jobs in areas where they are plentiful (Wolf 1982). Traditionally, nurses from the English-speaking Caribbean migrated to the U.K. because of the historical links and the similar nursing curriculum (Phillips 1996).

However, in 1980s, the U.S. government changed its immigration laws to encourage the migration of nurses from the Caribbean. These nurses were recruited by agents of private hospitals in the U.S., U.K. and Canada (Phillips 1996). In addition, there has been a recruitment of teachers from the Caribbean to work in these countries (Degazon-Johnson 2007). Afro-Caribbean migrants who migrated legally were in better a socio-economic situation than their counterparts in unskilled lower paying occupations and/or who were working in the U.S. illegally. Degazon-Johnson (2007) argues that the drain of these skilled workers from the Caribbean not only harmed the region, but that the
workers were often exploited by agents who misled them about their work conditions in their destination country.

For English-speaking Caribbean migrants, the U.S., U.K., and Canada have been attractive immigration destinations for economic opportunities due to their close proximity and the lack of a language barrier. There has been extensive cultural exchange between these countries and the Caribbean. The close social ties established between the Caribbean migrants and their communities in their home countries have been characterized as transnational migration. Transnational migration is practiced by migrants who develop cross-border networks that link them to societies in two or more geographic locations (Trotz 2006). Caribbean transnational migration is both permanent and temporary (Duval 2004).

While Caribbean migrants have established communities in these nations, the community has become increasingly mobile (Conway 2007). Caribbean migrants work both legally and illegally for extended periods of time in the U.S. in the service and agricultural industries (García 1986; Grasmuck and Grosfoguel 1997; Slocum and Thomas 2007). Caribbean migrants travel back and forth between their home countries and destination country for educational and business purposes as well as for vacations. Additionally, Caribbean migrants send remittances back to their country of origin to support family members to improve their standard of living (Connell and Conway 2000). As a result, Caribbean migrants have social networks that cross the geographic boundaries established by nation states (Fog Olwig 2003).
Afro-Caribbean migrants struggle with issues of cultural identity and race as they adjust to their new status as foreigners and as an ethnic minority (Campbell and McLean 2002; Hintzen 2001). Afro-Caribbean migrants often resist the construction of race in the U.S. because their own identities have been shaped through the prism of post-colonial struggles and in many instances, they have more positive perceptions of “blackness” (Harrison 1995). As a result, Afro-Caribbean migrants often suppress their cultural differences to create a stronger socio-political community which sometimes form tense alliances with the African American community (Campbell and McLean 2002; Hintzen 2001).

The experience of Afro-Caribbean migrants in the U.S. reflect Wolf’s (1982) argument that even though migrants are incorporated into the existing socio-political strata, their very presence altered the receiving society and their culture was similarly changed by their exposure to their new environment. Afro-Caribbean migrants have become a part in the “social fabric” of their new countries of residence. Caribbean carnivals in London, U.K., Toronto, Canada, New York City and Miami, have become important socio-cultural events that attract not just an interested public, but also local politicians seeking to raise their status and attract voters (Hintzen 2001). In the U.S., when the World Trade Center buildings in New York City were attacked on September 11th, 2001, it is estimated that over 60 families across the English-speaking Caribbean were left in mourning for lost relatives (Matthews 2004). Newspapers in Caribbean countries announce the deaths of young men and women who served in the U.S. military
in Iraq and Afghanistan (Trinidad Guardian 2008; Jamaica Observer 2007). These experiences have integrated Caribbean migrants into the U.S. society and in turn the society has been impacted by their presence.

Consequently, research about cultural beliefs and socioeconomic status associated with type 2 diabetes risk among these Afro-Caribbean women will provide important information about their health status as well as the state and local services required to meet their health needs in comparison to other immigrant populations in the U.S. This dissertation research will use the cultural consensus model to determine if there is shared cultural knowledge about type 2 diabetes among primarily Jamaican and Trinidadian women of African descent to determine the health care services that the need to improve their overall health.
Chapter III – Methodology

This dissertation research used both qualitative and quantitative methods to gather and analyze data. These methodologies and recruitment and sampling strategies are described in this section. The University of South Florida (USF) gave institutional research approval for this dissertation research (Appendix A). The dissertation research was conducted in two phases. In both phases of the dissertation research, socio-demographic, medical history and behavioral data were collected from study participants diagnosed with type 2 diabetes. The self-reported height and weight measurements from these study participants were collected to calculate body mass index (BMI). BMI categories were used to determine the prevalence of overweight and obesity among study participants. Semi-structured interviews about type 2 diabetes beliefs were conducted with all study participants diagnosed with the disease.

In the first phase of the dissertation research, a free list exercise was conducted with 20 study participants. Ten of these women were diagnosed with type 2 diabetes and 10 women did not have the disease. Free list data were collected from these study participants about the prevention, causes, symptoms, complications, and treatment of type 2 diabetes. In addition, 10 semi-structured interviews were conducted with study participants diagnosed with type 2 diabetes. The results of the analysis of semi-structured interviews and free list data were used to create a cultural consensus questionnaire. This
questionnaire was used to measure cultural beliefs about type 2 diabetes. In the second phase of the dissertation research, the cultural consensus questionnaire was administered to 30 study participants. Semi-structured interviews were conducted with 28 of the 30 study participants. Twenty-four of these interviews were conducted over the telephone. Figure 2 provides an overview of the research design.

**Phase I**

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/07-10/07</td>
<td>Developed free list exercise, semi-demographic surveys, and semi-structure interview protocols</td>
</tr>
<tr>
<td>11/07-12/07</td>
<td>Applied and received USF IRB approval for instruments and recruitment materials</td>
</tr>
<tr>
<td>1/08 -5/08</td>
<td>Recruited study participants who met study criteria. Administered free list exercise to Afro-Caribbean women; 10 with type 2 diabetes and 10 without type 2 diabetes Conducted semi-structured interviews with 10 Afro-Caribbean women with type 2 diabetes</td>
</tr>
<tr>
<td>4/08-6/08</td>
<td>Free list and interview analysis Designed cultural consensus questionnaire Revised semi-structure interview protocols Applied and received USF IRB approval for new instruments</td>
</tr>
</tbody>
</table>

**Phase II**

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/08-10/08</td>
<td>Administered cultural consensus questionnaires and conduct semi-structured interviews with 30 Afro-Caribbean women with type 2 diabetes</td>
</tr>
<tr>
<td>10/08-1/08</td>
<td>Data analysis - cultural consensus, non-parametric tests, and descriptive statistics Dissertation manuscript write-up</td>
</tr>
</tbody>
</table>

**Figure 2. Overview of the Research Design**
First Phase of Research

Initially, 20 study participants were recruited for this study. Semi-structured interviews about the management of type 2 diabetes, along with free list questions about the disease’s prevention, causes, symptoms, complications, and treatment of the disease were conducted with a convenience sample of 10 study participants diagnosed with type 2 diabetes. Seven of these 10 women were interviewed over the telephone. Socio-demographic/medical history/behavioral data and self-reported height and weight measurements were also collected from these study participants.

Additionally, 10 women who met the study’s age criteria, but had not been diagnosed with type 2 diabetes were asked the same free list questions. Semi-structured interviews about type 2 diabetes were not conducted with these women. The purpose of gathering free list data from 10 women without type 2 diabetes was to increase the probability that cultural beliefs were being gathered by these questions and not medical or individual knowledge accumulated from having the disease.

These semi-structured interviews were recorded and then transcribed. The transcripts were entered into Atlas.ti 5.0, a software program that performs qualitative analysis of textual, graphic and audio data. The interviews were coded in Atlas.ti 5.0 for thematic analysis. The themes that emerged from this analysis were converted into questions that were used to revise the interview protocol. The free list data were analyzed using ANTHROPAC 4.98, a software program that analyses both qualitative and quantitative data such as free lists, consensus analysis and a vary of multivariate analyses.
The results of the free list analysis conducted in ANTHROPAC 4.98 were used to design the cultural consensus questionnaire.

**Second Phase of Research**

In this phase of the research, the researcher recruited 30 additional study participant diagnosed with type 2 diabetes. After gathering socio-demographic/medical history/behavioral and self-reported height and weight data from each of these 30 study participants, they were asked to respond to the cultural consensus analysis questionnaire which focused on cultural beliefs about type 2 diabetes. Twenty eight of these 30 women were interviewed with the revised semi-structured interview protocol. Two women refused to participate in the interview. Seventeen of these 28 interviews were conducted over the telephone. Figure 3 below illustrates the data collection which occurred in phase 1 and 2 of the dissertation research.

After data collection was completed in the second phase of the research, the responses of the 30 study participants to the cultural consensus analysis questionnaire were entered into ANTHROPAC 4.98 for analysis. The semi-structured interviews with the additional 28 study participants were transcribed, entered into Atlas.ti 5.0, and analyzed to identify themes about cultural beliefs about type 2 diabetes and disease management. The self-reported height and weight data were used to calculate BMI. The BMI data were categorized and analyzed using SAS 9.1 to determine the prevalence of overweight and obesity in the study population. Descriptive statistics from the socio-
demographic/medical history/behavioral data of the all 40 study participants with type 2 diabetes were analyzed using SAS 9.1.

![Figure 3. Overview of the Research Sample and Instruments](image)

**Research Setting**

This dissertation research was conducted primarily in the Tampa Bay region of Florida. Florida is a popular settlement area for Afro-Caribbean migrants in the U.S. due to its proximity to the Caribbean. An estimated 1,105,079 individuals born in the Caribbean reside in Florida (U.S. Census Bureau 2000). The cities in the Tampa Bay
region are Tampa, St. Petersburg, and Clearwater. The counties that constitute the Tampa Bay region are Hernando, Pasco, Pinellas, and Hillsborough. An estimated 64,628 individuals born in the Caribbean reside in these counties (American Community Survey 2006). According to the U.S. Census Bureau (2000), English-speaking Afro-Caribbean migrants in the Tampa Bay region originate mainly from Jamaica, Trinidad and Tobago, and Guyana. The majority of these Caribbean migrants self-identify as black or African American (U.S. Census Bureau 2000). Over the last 20 years, the Tampa Bay region has undergone rapid economic development with an influx of new businesses which have lead to steady population growth and a housing boom. Most of the international migrants to the region have settled in Hillsborough County, followed by Pinellas County (U.S. Census Bureau 2000).

English-speaking Afro-Caribbean migrants in the Tampa Bay region are professionals, business owners, health care and service industry workers as well as retirees who have moved into the area from the Northeast and other parts of the U.S. (American Community Survey 2006). While there are no distinct geographic English-speaking Afro-Caribbean neighborhoods in Tampa Bay, these migrants have formed several local cultural associations that meet regularly and sponsor cultural events. For example, the Caribbean Community Association which performs a number of community support endeavors such as health outreach and tutoring and the Trinidad and Tobago American Association organizes the popular annual Tampa Bay Caribbean Carnival in St. Petersburg.
Sampling and Recruitment

Convenient and snowball sampling techniques were used to recruit a convenience sample of 40 women of African descent from the English-speaking Caribbean, 35 to 90 years of age who self-reported that they had been diagnosed with type 2 diabetes by a health professional. Individuals were also eligible for this study if they were born or lived in the Caribbean or if they self-identified as having cultural heritage from the region. Additionally, individuals had to self-identify as being of African or mixed African descent or black. The sample was comprised of 19 women from Jamaica and 16 women from Trinidad and Tobago, one woman from St. Lucia, and one woman from Grenada. Two women from Haiti and a woman Curacao were included in this study because they met the other eligibility criteria and their participation allowed the study to be completed in a timely manner.

From January 2008 to October 2008, study participants were recruited in person and through research flyers posted at Caribbean community events and Caribbean restaurants and/or grocery stores (Appendix B). The researcher attended the monthly meetings of the Caribbean Community Association (CCA). The researcher also attended other meetings of the Caribbean American Chamber of Commerce, Caribbean Cultural Exchange (USF Caribbean student organization), and community health fairs targeting the Caribbean and African American community. At these meetings and health fairs, the researcher networked with both attendees and health providers by discussing the
dissertation research, collecting contact information of potential study participants, and distributing IRB approved research business cards to identify study participants.

From August 2008 to October 2008, the researcher recruited study participants through a private medical practice of a Jamaican and a Haitian physician that had a high proportion of Caribbean patients, slightly over 50 percent according to the Jamaican physician. The private medical practice is located in a working class neighborhood in Tampa. The Jamaican physician gave the researcher permission to recruit women from his private medical clinic after reviewing the IRB documents. He agreed to identify patients who met the study criteria and direct them to the researcher. The researcher was located in a small unused office in the back of the practice. The researcher spent 3 days per week (Monday, Tuesday and Thursday from 9:00 a.m. to 1:00 p.m.) at this medical clinic recruiting study participants. After a month, the medical assistants had become familiar with the study participants’ eligibility criteria and would send potential study participants to the researcher without waiting for the Jamaican physician.

Once an eligible woman was identified, the researcher explained the purpose of the study and read an IRB approved research script (Appendix C) assuring her that her participation or lack of participation in this study would not affect her medical care. If the woman agreed to be interviewed, she was asked to write her name and contact telephone number on the research script so she could be contacted to arrange to conduct the interview at a more convenient time. If the woman had time or was waiting to be seen by the doctor, the interview was conducted in the office at the clinic in a private office, if not
interviews were conducted at her convenience which was usually over the telephone in the evening after dinner or on Sunday afternoons.

Study participants were asked if they knew other women with type 2 diabetes who would be willing to share their stories. The researcher requested that study participants contact these women to gage their interest and to gain their permission to contact them directly. Consequently, there are two pairs of sisters and one mother and daughter interviewed for this study.

All study participants gave their informed consent after the purpose of the dissertation research was explained and confidentiality was assured by the researcher. Study participants signed the informed consent form and agreed to allow their interviews to be recorded with a digital recorder (Appendix D). The researcher obtained permission from USF IRB for women interviewed over the telephone to give their verbal informed consent. The procedures used to conduct the telephone interviews are discussed in detail in the following section.

The semi-structured interviews and the administration of the questionnaires were conducted by the researcher, an Afro-Caribbean woman from Trinidad and Tobago, at times and locations convenient for study participants. Semi-structured interviews about type 2 diabetes beliefs were conducted with 38 study participants. Two study participants refused to consent to the interviews which followed the administration of the socio-demographic survey and cultural consensus questionnaire. All these semi-structured interviews were recorded and transcribed before being entered into Atlas.ti 5.0.
Socio-demographic data were also collected from the first 10 study participants diagnosed with type 2 diabetes recruited. They responded to the free list questionnaires and the initial semi-structured interviews, but they did not respond to the cultural consensus questionnaires. These women were not included in the cultural consensus analysis because their cultural knowledge about type 2 diabetes had already been contributed to the free list exercise which was the basis of the cultural consensus questionnaire. This methodological process was also followed so as to be consistent with previously conducted cultural consensus analysis studies (Daniulaityte 2004; Garro 2000; Weller et al. 1999; Ratanasuwan et al. 2005).

The semi-structured interviews were conducted with 28 study participants after administering the cultural consensus questionnaires. This sequence of administering the instruments may have led to a bias in the study participants’ interview responses. Study participants’ responses to the interviews may have been influenced by their responses to the cultural consensus questionnaires which had similar questions. Since cultural consensus analysis studies do not usually include semi-structured interviews, the researcher contacted William W. Dressler Ph.D., a medical anthropologist, who has had extensive experience conducting cultural consensus analysis studies to find out his opinion about any possible bias. Dressler’s opinion was that the in-depth interviews were a good idea because they contributed to the quantifying the centrality of the information in the network (electronic mail personal communication, May 13, 2009). Analysis of the semi-structured interviews identified unifying themes, but they also presented unifying
ideas and concepts about which study participants agreed and disagreed regarding their cultural beliefs about type 2 diabetes. Yet it is possible that administering the cultural consensus analysis first may have provided study participants with information that shaped their responses to the interviews.

Telephone Interviews

Of the total 38 semi-structured interviews, 24 interviews were conducted over the telephone for the study participants’ convenience. For interviews conducted over the telephone, the researcher received permission from USF IRB to gain study participants’ verbal consent. With their permission, the speaker function on the telephone was used to amplify the voices of study participant. The digital recorder with a microphone was placed next to the telephone so the interview could be recorded clearly. During the research process which included the administration of the cultural consensus questionnaire and socio-demographic survey, the researcher often had to ask the study participants to think about their responses as it related to their knowledge about type 2 diabetes in general as they would personalize the disease to their individual experience.

The 24 interviews conducted over the telephone lasted 28 minutes to 68 minutes with a mean of 43.33 minutes. The seven interviews that occurred at the private medical clinic lasted from 32 minutes to 49 minutes to complete with a mean of 37.9 minutes. The 6 interviews that occurred at study participants’ homes lasted from 32 minutes to 70 minutes to complete with a mean of 45.17 minutes. One interview that lasted 35 minutes
took place at a study participant’s workplace (a family restaurant). Table 2 provides an overview of the semi-structured interviews by location.

Table 2. Overview of 38 Semi-structured Interviews

<table>
<thead>
<tr>
<th>Interview Location</th>
<th>Number</th>
<th>Percentage</th>
<th>Mean Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone</td>
<td>24</td>
<td>63.16</td>
<td>43.33</td>
</tr>
<tr>
<td>Private medical clinic</td>
<td>7</td>
<td>18.4</td>
<td>37.9</td>
</tr>
<tr>
<td>Study participant’s home</td>
<td>6</td>
<td>15.8</td>
<td>45.17</td>
</tr>
<tr>
<td>Study participant’s workplace</td>
<td>1</td>
<td>2.6</td>
<td>35</td>
</tr>
</tbody>
</table>

In qualitative research, telephone interviews are perceived to be less desirable to face-to-face interviews. One drawback of telephone interviews is that the researcher is unable to observe the interviewee’s non-verbal cues such as gestures and eye movements (Carr and Worth 2001), but since these observations can be misinterpreted, they may not always be helpful for data analyses (Sturges and Hanrahan 2004). Another limitation to telephone interviews is that the researcher is unable to observe the interviewee in their natural environment e.g. attire and residence (Opdenakker 2006), but while these data may indicate socio-economic status, they may not always contribute to interpretation of data (Burnard 1994). A third drawback to telephone interviews is that there may be a lack of rapport between the researcher and interviewee which may diminish the quality of the interview (Novick 2008). However, it is possible the interviewee may be more relaxed and inclined to share sensitive information when the researcher is not present (Opdenakker 2006). Musselwhite (2006) and Burnard (1994) report that positive
relationships and rapport between researchers and study participants can be established over the telephone to improve the quality of the interviews. Strategies to establish rapport include meeting informally prior to the telephone interview and responding empathically when interviewees share sensitive information (Burnard 1994). Novick (2008) conclude that while there is no evidence that data loss compromises telephone interviews, more research is needed to determine how different interview modes impact the quality of data collected in qualitative research. Researchers also need to develop strategies and guidelines to improve the quality of interviews conducted over the telephone (Novick 2008).

Materials

*Socio-Demographic Questionnaire*

The socio-demographic/medical history/behavioral questionnaire (Appendix E) was administered to the 40 study participants with type 2 diabetes orally by the researcher. Socio-demographic data were gathered on age, gender, educational attainment, ethnicity, marital status, number of children, number of people in household, income, employment, occupation, place of birth, immigration status, and length of residence in Florida as well as other areas in the U.S.

The medical history data collected included diabetes status, date diagnosed with type 2 diabetes, family history of diabetes, date of last physician’s visit or check up and screening for type 2 diabetes, any prescribed medications for type 2 diabetes, other
medical conditions and any medications for those conditions, and non-biomedical medicines being used to treat type 2 diabetes. To measure access to health care, participants were asked if they had health insurance, if their health insurance covered cost of prescription drugs and glucometers strip, and if they could afford the health insurance co-pays for physician and medications (Ayanian et al. 2000; Pollitz 2005). If study participants stated that they found it financially difficult to meet these health costs on a regular basis, their health insurance coverage were determined to be inadequate and unaffordable. Study participants were also asked if they used traditional/alternative remedies to treat type 2 diabetes. Behavioral data were also collected on smoking, physical activity, alcohol consumption, as well as any lifestyle changes that occur as a result of study participants being diagnosed with type 2 diabetes.

*Semi-structured Interview Protocol*

The semi-structured interview protocol was designed to gather preliminary information about how women managed and treated type 2 diabetes on a daily basis. The protocol also sought to gain insight into the study participants’ cultural beliefs about type 2 diabetes as well as any problems that they encountered because of their socioeconomic status. Initially, the protocol (Appendix F) asked study participants how they reacted to their initial diagnosis, how they changed their lifestyle to manage the disease, and what is the most difficult challenge that they face with the disease.

After conducting interviews with the first 10 study participants with type 2 diabetes, the semi-structured interview protocol (Appendix G) was revised to reflect the
issues that emerged from their responses as well as the findings of research conducted on
the health beliefs about type 2 diabetes of Afro-Caribbean groups in the United Kingdom
(Brown, Avis, and Hubbard 2007; Scott 1998). One question added to the protocol
focused on the use of glucometers to test glucose levels on a regular basis. In the initial
interviews, study participants complained about the price of the strips and suggested that
this was one of the reasons that they did not test their blood glucose level daily so a
question was asked about the high costs of the glucometer strips used in the machine and
what happens when women ran out of strips. Study participants were also asked what
they could do to improve the management of their diabetes. This question was added
because study participants in the initial interviews often muttered that they could do
better with their diabetes.

Another question added to the protocol asked about the role of prayer in the
treatment of the disease. This question was added to explore the finding of a study
conducted by Scott (1998) in the U.K. with an Afro-Caribbean group that prayer played
an important role in the treatment of type 2 diabetes. The last question added asked what
Caribbean foods are good to eat with type 2 diabetes since some study participants
insisted that some Caribbean foods should be eaten to combat the disease.

Of the 30 study participants diagnosed with type 2 diabetes recruited after the
initial10 study participants with the diabetes, 28 women agreed to be interviewed with the
revised semi-structured protocol. The semi-structured interviews were recorded,
transcribed, entered into Atlas.ti 5.0 where they were coded for thematic analysis. The
researcher made detailed notes of four semi-structured interviews after listening to the electronic recordings and determining that they were inaudible. These notes also were entered into Atlas.ti 5.0 where they were coded for thematic analysis.

*Free List Exercise*

The free list questionnaire (Appendix H) was designed to determine the cultural relevant concepts about the prevention, causes, symptoms, complications, and treatment of type 2 diabetes that exist among study participants (Weller and Romney 1988). There were five major free list questions that asked what study participants thought prevented and caused type 2 diabetes as well as what were the symptoms, complications, and treatment for type 2 diabetes. Study participants were asked to give as many responses as they could to each question. After they finished their responses, the list of responses was recounted to them, and they were asked if they could think of any more responses before moving on to the next question.

This free list questionnaire was administered to a convenience sample of 10 study participants with type 2 diabetes and 10 study participants without the disease between the ages of 35 and 90 years. Of the 10 study participants with type 2 diabetes, four were registered nurses. Of the 10 study participants without type 2 diabetes, two were in the medical profession: a registered nurse and a certified nursing assistant. Study participants who are in the medical profession gave the most exhaustive responses to the free list questions, especially about the complications of type 2 diabetes. Study participants who did not have type 2 diabetes and/or were not in the medical profession informed the
researcher that they were drawing on their memories of the experiences of relatives or friends who had the disease to respond to the free list questions. In one instance, a study participant stated that she had recently gone to the diabetes clinic at a public hospital in Trinidad with her sister. Throughout her responses to the free list questions, this study participant constantly referred to the nurses’ type 2 diabetes awareness presentation given while she was in waiting room with her sister in the clinic.

After the free list data were collected, the responses of the 20 study participants were placed into the required format in text files in the same rank and imported into ANTHROPAC 4.98 (Bogatti 1996) for the free list analysis. In ANTHROPAC 4.98, the free list analysis tables provided not only the frequency of a study participant’s responses, but also the salience of each response. Salience measures the high frequency of a response along with its rank on the study participants’ lists. In ANTHROPAC 4.98, saliency is called Smith’s S. The line in each table is called the elbow and inserted by the researcher at the point where salience drops off. The researcher decided to insert the elbow where the frequency was ≥ 2. The researcher chose the items above the elbow to be included in the form of a question in the cultural consensus questionnaire which from here on is referred to as the Cultural Beliefs about Type 2 Diabetes questionnaire. The results of the free list questionnaire data analysis are presented in the Results section.

Cultural Beliefs about Type 2 Diabetes Questionnaire

The Cultural Beliefs about Type 2 Diabetes questionnaire (Appendix I) was designed to determine if the study participants share cultural beliefs about type 2
diabetes. The questionnaire had 53 questions grouped together in sections: seven items asked about prevention, 11 items focused on causation, 14 items asked about symptoms, 13 items focused on complications, and the final eight items asked about treatment and management of the disease. About half of the questions were phrased to elicit positive and negative responses so as to reduce the instances of guessing by the study participants. The questionnaire had a “yes” and “no” answer key. The responses were coded, “1 = yes” and “0 = no” and were entered into a text file, entered and analyzed in ANTHROPARC 4.98.

Forty-three questions on the Cultural Beliefs about Type 2 Diabetes questionnaire were drawn primarily from the items above the elbow in the free list analysis of the study participant’s responses. One item not above the elbow which was mentioned by one study participant without type 2 diabetes was added to the questionnaire. This item was “ants following the urine” as a sign of type 2 diabetes. According to the study participant whose mother had type 2 diabetes, this belief originated from the time when most Caribbean homes had outhouses. People would urinate in the potties at night and empty them in the outhouses in the morning. If ants surrounded or followed the potty, it meant that the urine was sweet with sugar and the person might have type 2 diabetes. This belief was added to the questionnaire because it was determined that it might be a specific Caribbean belief that a study participant might be reluctant to share if not directly asked by the researcher.
In addition, ADA guidelines and criteria about type 2 diabetes’ etiology and treatment were reviewed and any of these items not mentioned by the study participants were added to the questionnaire. There were four of these items: 1) can type 2 diabetes during pregnancy cause diabetes later on? 2) does type 2 diabetes cause skin problems? 3) does type 2 diabetes cause gum problems? and 4) does type 2 diabetes cause stomach problems?

Other questions added to the Cultural Beliefs about Type 2 Diabetes questionnaire were drawn from the themes that emerged from the initial interviews. Two questions focused on the role that living in the U.S. versus the Caribbean played in preventing and causing the onset of type 2 diabetes. A third question asked if a traditional Caribbean diet was helpful in controlling the disease. A question about whether prayer was helpful in controlling type 2 diabetes was also added to the questionnaire. Since there were conflicting responses to the use of alternative medications to control type 2 diabetes in the first set of interviews, this question was added to the questionnaire to determine if this belief was shared by the study population as a whole.

The Cultural Beliefs about Type 2 Diabetes questionnaire was administered to 30 study participants. The researcher asked the questions orally to the study participants who were assured that there were no right or wrong answers and that they were free to answer whatever was their opinion or belief about type 2 diabetes. The administration of the questionnaire was recorded to capture the study participants’ ruminations about their
answers which revealed additional thoughts and beliefs on the topics asked by the researcher.

**Analysis**

To discover if study participants shared cultural beliefs about type 2 diabetes’ etiology, treatment and symptoms and how this belief model along with their socioeconomic status influenced their management of the disease and health care decisions, cultural consensus analysis and qualitative analysis of semi-structured interviews were conducted and analyzed using ANTHROPAC 4.98 and Atlas.ti 5.0, respectively. Nonparametric tests including the Fisher exact text and Spearman correlation analysis were conducted in SAS 9.1 to determine association between individual cultural knowledge scores and selected socio-demographic variables and cultural beliefs about type 2 diabetes.

Self-reported height and weight were used to calculate BMI. Fisher exact text, Spearman correlation analysis and Mann-Whitney $U$ test were used to determine the association of BMI with socio-demographic variables as well as individual cultural knowledge scores. Descriptive statistics of the study participants’ socio-demographic, medical history and health behaviors were conducted using SAS 9.1. Scatter plots were made to further interpret the relationships among the socio-demographic variables, individual cultural knowledge scores, and BMI.
Cultural Consensus Analysis

Cultural consensus analysis was used to determine if study participants share cultural beliefs about type 2 diabetes. Cultural consensus theory contends that each individual in a culture has some cultural knowledge about a cultural domain and that this knowledge can be measured by asking a series of questions about that domain (Weller 2007). Cultural consensus analysis measures the degree to which cultural beliefs about this domain are shared by a study population (Weller 2007). Cultural consensus analysis also provides the answer deemed to be the most cultural appropriate for each question posed and correlates each respondent’s answer to the aggregation of the responses to the study population’s shared cultural knowledge about the domain (Weller and Romney 1988:74).

Cultural consensus analysis has these three main assumptions: 1) each respondent answers questions independently from others in the study, 2) questions are asked about the same cultural domain, and 3) there are a specific set of answers to the questions so the answer key can be multiple choice or dichotomous, true/false or yes/no (Weller 2007). Additionally, cultural consensus analysis assumes that if they know the answer, respondents answer questions correctly, otherwise the respondents guess the answers.

When using dichotomous answers (true/false, yes/no), cultural consensus analysis allows for the use of the match coefficient method or the covariance method (Weller 2007). The match coefficient method assumes that there is no response bias i.e., that respondents do not answer “yes” when they do not know or are unsure of an answer.
study population’s knowledge can appear stronger than if conducted with the covariance method because the presence of response bias increases the level of agreement. While not susceptible to response bias, the covariance method is sensitive to the percentages of “true” or “yes” responses in a data set. Consequently, questions must be carefully constructed so that the “true” or “yes” responses fall between 30 percent and 70 percent.

Cultural consensus analysis identifies if there is a shared level of agreement about the culturally appropriate responses by creating an agreement matrix with coefficients of the match coefficient and covariance methods (Weller 2007). This is a type of factor analysis that loads the knowledge scores onto the first factor. Cultural consensus analysis generates a goodness of fit index which is estimated with eigenvalues to determine if there is a single set of shared beliefs (Weller 2007). There is homogeneity of cultural beliefs if the first eigenvalue is three times greater than the second eigenvalue. This homogeneity indicates that there is a high degree of consistency/agreement of beliefs about the cultural domain (Weller and Mann 1997). Individual knowledge scores from zero to one (the closer to one, the more culturally knowledgeable) can be interpreted as the proportion of shared cultural beliefs. Individual responses are weighted by their knowledge and aggregated to calculate a Bayesian posteriori probability for each question (Weller et al. 1999).

To identify if a study population shares cultural beliefs, cultural consensus analysis requires at least 50 percent level of agreement which is why this method of analysis does not need large sample sizes (Weller and Romney 1988:76). After all, there
is a higher probability of agreement with a fewer number of respondents familiar with a cultural domain. However, prior to starting a research study, the level of agreement or cultural knowledge of respondents is unknown so Weller (2007) recommends a conservative estimate of 50 percent level of agreement, 99 percent confidence level, and 95 percent correct item classification for which a minimum sample size of 30 is required for dichotomous data.

In this dissertation research, the researcher followed Weller’s recommendation and used a conservative estimate of \( p = .5 \) group level of agreement, \( p < .99 \) confidence level, and \( p = .95 \) high accurate level of item classification. Thirty study participants diagnosed with type 2 diabetes were recruited to respond to the Cultural Beliefs about Type 2 Diabetes questionnaire which had a dichotomous answer key of “yes” and “no” with 50/50 negative and positive items. The covariance method was used, however, the match coefficient method was also performed, and the knowledge estimates compared to determine if any response bias was present. After being performed on the 30 study participants, the cultural consensus analysis was also run separately on study participants with medical education/training and study participants without medical education/training to determine if their cultural belief model about type 2 diabetes was different.

Analysis of Individual Cultural Knowledge Scores

The cultural consensus analysis calculated individual cultural knowledge scores for each study participant. The Student’s \( t \)-test was performed in SAS 9.1 to determine if there was a statistically significant difference at \( p < .05 \) between the means of the
individual cultural knowledge scores for study participants with medical education training and study participants without medical education training.

Nonparametric tests were used to analyze the associations between the individual cultural knowledge scores and socio-demographic variables. Spearman correlation analysis was performed in SAS 9.1 to determine if there was a significant co-variation at $p < .05$ between study participants’ individual cultural knowledge scores and the socio-demographic variables; age, age of type 2 diabetes diagnosis, years of education, years of type 2 diabetes duration, and length of time in the U.S. (Weller et al. 1999; Ratanasuwan 2005). The length of time in the U.S. may be viewed as a proxy variable for acculturation (Himmelgreen et al. 2005). Spearman correlation analysis was performed because the socio-demographic data were not normal which violates the assumption of the Pearson correlation analysis and multiple regression. (Madrigal 1999).

**Analysis of Cultural Belief Themes**

Qualitative analysis of the semi-structured interviews was used to determine how socioeconomic status and cultural beliefs about type 2 diabetes influenced how study participants managed the disease and their health decisions. The semi-structured interviews were transcribed and then coded prior to being entered into Atlas.ti 5.0. Deductive and inductive approaches were used to identify themes and patterns about socioeconomic status and cultural beliefs about type 2 diabetes (Schensul, Schensul, and LeCompte 1999). For the first stage of interviews with 10 study participants with type 2
diabetes, the researcher deductively created the questions from the literature as well as informal conversations about type 2 diabetes conducted in the Caribbean community.

In the second phase of interviews with 30 additional study participants with type 2 diabetes, the semi-structured protocol was revised to incorporate themes that emerged from the study participants’ responses to the initial interviews (Schensul, Schensul, and LeCompte 1999; Weller et al. 1999). Additional data were gathered from the recordings of responses to both the socio-demographic/medical history/behavioral and Cultural Beliefs about Type 2 Diabetes questionnaires.

Using SAS 9.1, the Fisher exact test was performed to determine if there were significant relationships at $p < .05$ between the study participants’ cultural beliefs that traditional/alternative remedies, modified traditional Caribbean diet, and prayer/faith are effective treatments of type 2 diabetes and the socio-demographic variables: age, years of type 2 diabetes duration, education attainment, income, country of origin, medical training, transnational migration, and length of time in the U.S. After the study participants’ cultural beliefs were identified, they were coded as “yes” and “no.” The socio-demographic variables were also categorized for analysis. The Fisher exact test was performed because the expected frequencies were less than five which violated the assumption of the Chi square test (Madrigal 2008).

*Analysis of Self-Reported Measurements*

The anthropometric methods most frequently used to measure obesity and abdominal adiposity include body mass index (BMI). To calculate BMI, researchers use
Quetelet’s index which is “weight in kilograms” divided by “height in meters squared” (Mooteri et al. 2004). According to the World Health Organization (Racette et al. 2003):

- Underweight = <18.5
- Normal weight = 18.5–24.9
- Overweight = 25.0–29.9
- Obese = ≥ 30.0

The primary drawback of using BMI is that it is unable to differentiate between weight that is muscle versus weight that is fat. Consequently, individuals who are very muscular may be classified as overweight, while older individuals with decreased muscle mass and excess fat may have an acceptable BMI (Racette et al. 2003).

The strengths of these anthropometric methods are that they are noninvasive, easy to calculate and inexpensive. The main limitation of these anthropometric methods to measure obesity and abdominal adiposity is that they do not distinguish between intra-abdominal fat (IAF) and subcutaneous abdominal fat (SAF) (Greenfield et al. 2002). Computed tomography (CT) and magnetic resonance imaging (MRI) have been found to be the most accurate means to measure IAF. However, the CT and MRI equipment are too expensive and time consuming to be used in most research studies (Greenfield et al. 2002).

In this dissertation research, study participants were asked to self-report their height and weight. Previous research (Engstrom 2003; Brunner Huber 2007) on the accuracy of self-reported height and weight has found that women consistently overestimate their height and underestimate their weight which can lead to misclassification of BMI status (i.e., the underestimation of obesity). However, self-
reported height and weight gives an indication of the prevalence of overweight and obesity in this study population.

Other studies (Dauphinot et al. 2008; Nyholm et al. 2007) suggest that adjustments can be made to reduce the misclassification of BMI status when using self-reported height and weight data. Dauphinot and colleagues (2008) suggest that based on their study of the self-reported height and weight data of Swiss and French populations lowering the obesity threshold to 29.2 makes the proportion of obese study participants closer to the true prevalence in the study population. The study conducted by Dauphinot and colleagues (2008) is relatively recent and there has been no consensus that lowering the obesity category to 29.2 will increase the validity of self-reported height and weight data. Also, Dauphinot and colleagues (2008) conducted their research on European populations. In this dissertation research, another limitation of lowering the obesity threshold is the small sample size. Thus, lowering obesity categorization may not reduce the misclassification of BMI status significantly enough to capture the true proportion of obesity in this study population. Acknowledging these limitations, this dissertation research lowered the threshold of obesity from 30.0 to 29.2 to reduce misclassification.

Spearman correlation analysis was conducted in SAS 9.1 to determine association between BMI and individual cultural knowledge scores as well as socio-demographic variables such as age, age at diagnosis, and length of time in the U.S. To understand the relationship between BMI and age and BMI and age at type 2 diabetes diagnosis. The BMI of study participants was categorized into normal weight, overweight and obesity
categories as well as into normal weight versus the collapsed categories of overweight and obesity categories and then the mean age and mean age at type 2 diagnosis was calculated. The Mann-Whitney U test was then performed to determine if there was a statistically difference between the mean age and mean age at type 2 diagnosis by BMI category.

Since obesity increases the risk for type 2 diabetes and is a debilitating medical condition, the Chi square test was performed in SAS 9.1, to determine if there was a significant relationship at $p < .05$ between socio-demographic variables and obese versus non-obese in this study population. The BMI categories; normal weight and overweight were collapsed to create a non-obese category since obesity is the risk factor for type 2 diabetes. The socio-demographic variables: age at type 2 diabetes diagnosis, years of type 2 diabetes duration, education attainment, income, and length of time in the U.S. were also categorized. However, the assumptions of the Chi square test were violated because the expected frequencies were less than five, with the exception of analysis of obese/non-obese and the use of traditional/alternative remedies (Madrigal 2008). Consequently, the Fisher exact test was used to determine if there were significant relationships at $p < .05$ between obese/non-obese and the remaining socio-demographic variable.

Finally, the crude obesity prevalence was calculated with the number of obese study participants as the numerator and the number of study participants who self-reported their height and weight as the denominator. The direct method of standardization was used to calculate the age-adjusted prevalence of obesity of the study population. The
population data from the 2000 United States Bureau of the Census decennial census was used as the standard. To calculate the age-adjusted obesity prevalence, the subgroup specific rates of the study population were multiplied by the population from the decennial census in the same age subgroup and divided by the total the population from the decennial census in those age groups. The age subgroup specific rates were calculated by dividing the number of obese study participants by the number of study participants in that age subgroup. From the age categories were taken from the 2000 United States Bureau of the Census decennial census were: 35–39 years, 40–44 years, 45–49 years, 50–54 years, 55–59 years, 60–61 years, 62–64 years, 65–66 years, 67–69 years, 70–74 years, 75–79 years, 80–84 years, and 85 years and older. The direct adjustment allows comparison of the crude obesity prevalence with the risk in the standard population.
Chapter IV – Results

The analysis of the free list data used to develop the cultural consensus questionnaire is presented first and then the analysis of the socio-demographic, medical, and behavioral data. The results of analyzing the data to answer the four guiding research questions are then discussed sequentially.

Free List Data

The first 20 study participants participated in the free list exercise. Ten of the study participants had been diagnosed with type 2 diabetes, while the other ten study participants had not been diagnosed with the disease. The 20 study participants were asked to list what they believed could prevent and cause type 2 diabetes. They were also asked to list the symptoms, complications, and treatments of type 2 diabetes. Their responses were entered into ANTHROPAC 4.98 and the free list procedure was run to analyze these data. The full results of the analysis of the free list data are presented in Tables 2 to 6.
Table 3 shows the study participants’ beliefs about the prevention of type 2 diabetes. The items with a frequency \(>5\) and a salience over 0.062 above the elbow (the horizontal line in the table) were included in the Cultural Beliefs about Type 2 Diabetes questionnaire. These 6 items were “healthy diet,” “exercise,” diabetes “cannot be prevented,” “lose weight,” “watch starches,” and “get tested” by a physician.

**Table 3. Free list Analysis: Prevention of Type 2 Diabetes**

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Smith’s S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy Diet</td>
<td>13</td>
<td>65</td>
<td>0.601</td>
</tr>
<tr>
<td>Exercise</td>
<td>11</td>
<td>55</td>
<td>0.346</td>
</tr>
<tr>
<td>Cannot Be Prevented</td>
<td>4</td>
<td>20</td>
<td>0.200</td>
</tr>
<tr>
<td>Lose Weight</td>
<td>4</td>
<td>20</td>
<td>0.117</td>
</tr>
<tr>
<td>Watch Starches</td>
<td>3</td>
<td>15</td>
<td>0.061</td>
</tr>
<tr>
<td>Get Tested</td>
<td>3</td>
<td>15</td>
<td>0.062</td>
</tr>
<tr>
<td>No Fatty Stuff</td>
<td>1</td>
<td>5</td>
<td>0.036</td>
</tr>
<tr>
<td>No Red Meat</td>
<td>1</td>
<td>5</td>
<td>0.021</td>
</tr>
<tr>
<td>Eat Fish</td>
<td>1</td>
<td>5</td>
<td>0.014</td>
</tr>
<tr>
<td>Less Sugar</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>Awareness</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>Less Sugar And Carbs</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>Eat Greens</td>
<td>1</td>
<td>5</td>
<td>0.017</td>
</tr>
<tr>
<td>Digest Food Properly</td>
<td>1</td>
<td>5</td>
<td>0.025</td>
</tr>
<tr>
<td>Prevent Stress</td>
<td>1</td>
<td>5</td>
<td>0.025</td>
</tr>
</tbody>
</table>

Table 4 illustrates the study participants’ beliefs about the causation of type 2 diabetes. In this instance, the items with a frequency \(>2\) above the elbow were included in the Cultural Beliefs about Type 2 Diabetes questionnaire. These 8 items were “poor eating,” “hereditary,” “lack of exercise,” “pancreas not working,” “obesity,” “high blood glucose,” “poor lifestyle,” and “too much sweets.”
Table 4. Free list Analysis: Causes of Type 2 Diabetes

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Smith’s S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor Eating</td>
<td>11</td>
<td>55</td>
<td>0.378</td>
</tr>
<tr>
<td>Hereditary</td>
<td>8</td>
<td>40</td>
<td>0.287</td>
</tr>
<tr>
<td>Lack of Exercise</td>
<td>8</td>
<td>40</td>
<td>0.168</td>
</tr>
<tr>
<td>Pancreas Not Working</td>
<td>5</td>
<td>25</td>
<td>0.250</td>
</tr>
<tr>
<td>Obesity</td>
<td>4</td>
<td>20</td>
<td>0.115</td>
</tr>
<tr>
<td>High Blood Glucose</td>
<td>4</td>
<td>20</td>
<td>0.142</td>
</tr>
<tr>
<td>Poor Lifestyle</td>
<td>2</td>
<td>10</td>
<td>0.075</td>
</tr>
<tr>
<td>Too Much Sweets</td>
<td>2</td>
<td>10</td>
<td>0.042</td>
</tr>
<tr>
<td>Starch Builds Up</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>Not Enough Insulin</td>
<td>1</td>
<td>5</td>
<td>0.033</td>
</tr>
<tr>
<td>Not Sure</td>
<td>1</td>
<td>5</td>
<td>0.017</td>
</tr>
<tr>
<td>Overweight</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>Watch Starch</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>Too Much Carbs</td>
<td>1</td>
<td>5</td>
<td>0.008</td>
</tr>
<tr>
<td>Insulin</td>
<td>1</td>
<td>5</td>
<td>0.042</td>
</tr>
<tr>
<td>Lifestyle</td>
<td>1</td>
<td>5</td>
<td>0.025</td>
</tr>
<tr>
<td>Refined Food</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>Fatigue</td>
<td>1</td>
<td>5</td>
<td>0.017</td>
</tr>
<tr>
<td>Stress</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
</tbody>
</table>

Table 5 shows the study participants’ beliefs about the symptoms of type 2 diabetes. In this instance, the items with a frequency >2 and a salience over 0.092 above the elbow were included in the Cultural Beliefs about Type 2 Diabetes questionnaire.

These 13 items were “frequent urination,” “thirst,” “dizziness,” “sweating,” “sleepy,” “lose weight,” “fatigue,” “get tested,” “vaginal infections,” “wounds not healing,” “blurry vision,” “fruity sweet breath,” and “numbness.”
Table 5. Free list Analysis: Symptoms of Type 2 Diabetes

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Smith’s S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent Urination</td>
<td>13</td>
<td>65</td>
<td>0.508</td>
</tr>
<tr>
<td>Thirst</td>
<td>11</td>
<td>55</td>
<td>0.383</td>
</tr>
<tr>
<td>Dizziness</td>
<td>3</td>
<td>15</td>
<td>0.078</td>
</tr>
<tr>
<td>Sweating</td>
<td>3</td>
<td>15</td>
<td>0.087</td>
</tr>
<tr>
<td>Sleepy</td>
<td>3</td>
<td>15</td>
<td>0.066</td>
</tr>
<tr>
<td>Lose Weight</td>
<td>2</td>
<td>10</td>
<td>0.075</td>
</tr>
<tr>
<td>Fatigue</td>
<td>2</td>
<td>10</td>
<td>0.075</td>
</tr>
<tr>
<td>Get Tested</td>
<td>2</td>
<td>10</td>
<td>0.054</td>
</tr>
<tr>
<td>Vaginal Infections</td>
<td>2</td>
<td>10</td>
<td>0.038</td>
</tr>
<tr>
<td>Wounds Not Healing</td>
<td>2</td>
<td>10</td>
<td>0.100</td>
</tr>
<tr>
<td>Blurry Vision</td>
<td>2</td>
<td>10</td>
<td>0.067</td>
</tr>
<tr>
<td>Fruity Sweet Breath</td>
<td>2</td>
<td>10</td>
<td>0.038</td>
</tr>
<tr>
<td>Numbness</td>
<td>2</td>
<td>10</td>
<td>0.092</td>
</tr>
<tr>
<td>Coma</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>Dry Mouth</td>
<td>1</td>
<td>5</td>
<td>0.042</td>
</tr>
<tr>
<td>Body Itching</td>
<td>1</td>
<td>5</td>
<td>0.033</td>
</tr>
<tr>
<td>Tingling Feet</td>
<td>1</td>
<td>5</td>
<td>0.025</td>
</tr>
<tr>
<td>Speech Slurred</td>
<td>1</td>
<td>5</td>
<td>0.042</td>
</tr>
<tr>
<td>Seizures</td>
<td>1</td>
<td>5</td>
<td>0.025</td>
</tr>
<tr>
<td>Unwell</td>
<td>1</td>
<td>5</td>
<td>0.025</td>
</tr>
<tr>
<td>Craving Sweets</td>
<td>1</td>
<td>5</td>
<td>0.017</td>
</tr>
<tr>
<td>Weak</td>
<td>1</td>
<td>5</td>
<td>0.008</td>
</tr>
<tr>
<td>Poor Circulation</td>
<td>1</td>
<td>5</td>
<td>0.008</td>
</tr>
<tr>
<td>Gain Weight</td>
<td>1</td>
<td>5</td>
<td>0.042</td>
</tr>
<tr>
<td>Blindness</td>
<td>1</td>
<td>5</td>
<td>0.033</td>
</tr>
<tr>
<td>Overeat</td>
<td>1</td>
<td>5</td>
<td>0.025</td>
</tr>
<tr>
<td>Wobbly</td>
<td>1</td>
<td>5</td>
<td>0.033</td>
</tr>
<tr>
<td>Colorless Urine</td>
<td>1</td>
<td>5</td>
<td>0.025</td>
</tr>
<tr>
<td>Black Out</td>
<td>1</td>
<td>5</td>
<td>0.017</td>
</tr>
<tr>
<td>Liver Damage</td>
<td>1</td>
<td>5</td>
<td>0.030</td>
</tr>
<tr>
<td>Fogginess</td>
<td>1</td>
<td>5</td>
<td>0.008</td>
</tr>
<tr>
<td>Ants Follow Urine</td>
<td>1</td>
<td>5</td>
<td>0.010</td>
</tr>
<tr>
<td>Irritability</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>Stomach Pain</td>
<td>1</td>
<td>5</td>
<td>0.010</td>
</tr>
<tr>
<td>Dehydration</td>
<td>1</td>
<td>5</td>
<td>0.013</td>
</tr>
<tr>
<td>Cannot Sleep</td>
<td>1</td>
<td>5</td>
<td>0.017</td>
</tr>
<tr>
<td>Hypoglycemia</td>
<td>1</td>
<td>5</td>
<td>0.025</td>
</tr>
<tr>
<td>Black marks on Face/Neck</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>Bloat</td>
<td>1</td>
<td>5</td>
<td>0.025</td>
</tr>
<tr>
<td>Major Killer</td>
<td>1</td>
<td>5</td>
<td>0.013</td>
</tr>
</tbody>
</table>
Table 6 shows the study participants’ beliefs about the complications of type 2 diabetes. In this instance, the items with a frequency > 2 and a salience over 0.054 above the elbow were included in the Cultural Beliefs about Type 2 Diabetes questionnaire. These 11 items were “amputation,” “kidney failure,” “blindness,” “hypertension,” “heart disease,” “numbness,” “coma,” “bad circulation,” “stroke,” “heart attack,” and “cataracts.”
Table 6. Free list Analysis: Complications of Type 2 Diabetes

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Smith’s S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amputation</td>
<td>12</td>
<td>60</td>
<td>0.404</td>
</tr>
<tr>
<td>Kidney Failure</td>
<td>9</td>
<td>45</td>
<td>0.331</td>
</tr>
<tr>
<td>Blindness</td>
<td>7</td>
<td>35</td>
<td>0.278</td>
</tr>
<tr>
<td>Hypertension</td>
<td>5</td>
<td>25</td>
<td>0.135</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>5</td>
<td>25</td>
<td>0.101</td>
</tr>
<tr>
<td>Numbness</td>
<td>5</td>
<td>25</td>
<td>0.108</td>
</tr>
<tr>
<td>Coma</td>
<td>4</td>
<td>20</td>
<td>0.169</td>
</tr>
<tr>
<td>Bad Circulation</td>
<td>3</td>
<td>15</td>
<td>0.092</td>
</tr>
<tr>
<td>Stroke</td>
<td>3</td>
<td>15</td>
<td>0.074</td>
</tr>
<tr>
<td>Heart Attack</td>
<td>3</td>
<td>15</td>
<td>0.150</td>
</tr>
<tr>
<td>Cataracts</td>
<td>2</td>
<td>10</td>
<td>0.054</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>Dizzy</td>
<td>1</td>
<td>5</td>
<td>0.033</td>
</tr>
<tr>
<td>Weight Gain</td>
<td>1</td>
<td>5</td>
<td>0.007</td>
</tr>
<tr>
<td>Seizures</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>1</td>
<td>5</td>
<td>0.014</td>
</tr>
<tr>
<td>Sweating</td>
<td>1</td>
<td>5</td>
<td>0.030</td>
</tr>
<tr>
<td>Sleepiness</td>
<td>1</td>
<td>5</td>
<td>0.021</td>
</tr>
<tr>
<td>Liver Failure</td>
<td>1</td>
<td>5</td>
<td>0.025</td>
</tr>
<tr>
<td>Lose Consciousness</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>Hypoglycemia</td>
<td>1</td>
<td>5</td>
<td>0.029</td>
</tr>
<tr>
<td>Jittery</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>Wounds Do Not Heal</td>
<td>1</td>
<td>5</td>
<td>0.025</td>
</tr>
<tr>
<td>Scratching</td>
<td>1</td>
<td>5</td>
<td>0.008</td>
</tr>
<tr>
<td>Artery Disease</td>
<td>1</td>
<td>5</td>
<td>0.017</td>
</tr>
<tr>
<td>Circulatory Disease</td>
<td>1</td>
<td>5</td>
<td>0.008</td>
</tr>
<tr>
<td>Liver Failure</td>
<td>1</td>
<td>5</td>
<td>0.033</td>
</tr>
<tr>
<td>Not Comfortable</td>
<td>1</td>
<td>5</td>
<td>0.038</td>
</tr>
<tr>
<td>Killer</td>
<td>1</td>
<td>5</td>
<td>0.040</td>
</tr>
<tr>
<td>Organs Shut Down</td>
<td>1</td>
<td>5</td>
<td>0.020</td>
</tr>
<tr>
<td>Blurry Eyes</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>Cannot Work</td>
<td>1</td>
<td>5</td>
<td>0.033</td>
</tr>
<tr>
<td>Adverse Reaction</td>
<td>1</td>
<td>5</td>
<td>0.017</td>
</tr>
<tr>
<td>Retinopathy</td>
<td>1</td>
<td>5</td>
<td>0.029</td>
</tr>
<tr>
<td>Age Spots</td>
<td>1</td>
<td>5</td>
<td>0.021</td>
</tr>
<tr>
<td>Cellulitis</td>
<td>1</td>
<td>5</td>
<td>0.017</td>
</tr>
<tr>
<td>Blood Clots</td>
<td>1</td>
<td>5</td>
<td>0.025</td>
</tr>
<tr>
<td>Crave Food</td>
<td>1</td>
<td>5</td>
<td>0.017</td>
</tr>
<tr>
<td>Gain Weight</td>
<td>1</td>
<td>5</td>
<td>0.008</td>
</tr>
<tr>
<td>Tight Chest Pain</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>Check Foot/Finger</td>
<td>1</td>
<td>5</td>
<td>0.025</td>
</tr>
</tbody>
</table>
Table 7 shows the study participants’ beliefs about the treatments of type 2 diabetes. In this instance, the items with a frequency >2 and a salience over 0.054 above the elbow were included in the Cultural Beliefs about Type 2 Diabetes questionnaire. These 5 items were “medication,” “insulin,” “diet,” “exercise,” and “lose weight.”

Table 7. Free list Analysis: Treatments of Type 2 Diabetes

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Smith’s S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication</td>
<td>20</td>
<td>100</td>
<td>0.712</td>
</tr>
<tr>
<td>Insulin</td>
<td>13</td>
<td>65</td>
<td>0.498</td>
</tr>
<tr>
<td>Diet</td>
<td>13</td>
<td>65</td>
<td>0.404</td>
</tr>
<tr>
<td>Exercise</td>
<td>10</td>
<td>50</td>
<td>0.300</td>
</tr>
<tr>
<td>Lose Weight</td>
<td>4</td>
<td>20</td>
<td>0.072</td>
</tr>
<tr>
<td>Check Blood Glucose</td>
<td>1</td>
<td>5</td>
<td>0.050</td>
</tr>
<tr>
<td>No Stress</td>
<td>1</td>
<td>5</td>
<td>0.030</td>
</tr>
<tr>
<td>Vitamins</td>
<td>1</td>
<td>5</td>
<td>0.010</td>
</tr>
</tbody>
</table>

Socio-demographic Data

Of the 40 study participants diagnosed with type 2 diabetes interviewed, the mean age was 62.6 years with a minimum age of 36 years and maximum age of 87 years. Thirty five (87.5 percent) of these women reported their ethnicity as black or African-American, two (5 percent) women reported their ethnicity as “other,” one (2.5 percent) woman reported her ethnicity as “mixed,” one (2.5 percent) woman reported her ethnicity as West Indian and one (2.5 percent) woman reported her ethnicity as black Hispanic.

Study population characteristics are displayed in Table 8.
Table 8. Characteristics of Study Participants

<table>
<thead>
<tr>
<th>Socio-Demographic</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>62.625</td>
<td>12.25</td>
<td>36 – 87</td>
</tr>
<tr>
<td>Years living in U.S.</td>
<td>20.44</td>
<td>11.88</td>
<td>4 – 42</td>
</tr>
<tr>
<td>Years of Type 2 Diabetes Duration</td>
<td>11.82</td>
<td>9.3</td>
<td>.5 – 38</td>
</tr>
<tr>
<td>Age at type 2 diabetes onset</td>
<td>51.23</td>
<td>13.8</td>
<td>23 – 80</td>
</tr>
<tr>
<td>Years of Education</td>
<td>12.575</td>
<td>9.3</td>
<td>6 – 17</td>
</tr>
<tr>
<td>No. of Children</td>
<td>3</td>
<td>1.9</td>
<td>0 – 8</td>
</tr>
</tbody>
</table>

The mean number of years that these 40 study participants diagnosed with type 2 diabetes have lived in the U.S. is 20 years with a minimum of four years and maximum of 42 years. Nine (22.5 percent) of the study participants have lived in the U.S. from 31 to 40 years, eight (20 percent) women from 11 to 20 years, five (12.5 percent) women from 21 to 30 years, three (7.5 percent) women over 40 years and two (5 percent) women from five to 10 years. The remaining 13 (32.5 percent) study participants with visitor’s visas lived in the U.S. for part of the year (usually six months) and in their country of origin for the rest of the year. The mean number of years that these 13 women have been engaging in transnational migration was 11 years with a minimum of four years and maximum of 22 years. These women live with family members and close friends when they visit the U.S. They took on child care roles for their grandchildren and great-grandchildren for most of their visit. Unsurprisingly, the household incomes of these women were the lowest of all the study participants.

The marital status of the 40 study participants diagnosed with type 2 diabetes were as follows; 20 (50 percent) were married, eight (20 percent) were widowed, six (15 percent) were single, five (12.5 percent) divorced and one (2.5 percent) woman was
separated from her husband. The mean number of children of these study participants was three with a minimum of no children and maximum of eight children. Nineteen (47.5 percent) of these Afro-Caribbean women were from Trinidad and Tobago, 16 (40 percent) women were from Jamaica, two (5 percent) women were from Haiti, one (2.5 percent) woman was from Curaçao, one (2.5 percent) woman was from Guyana, and one (2.5 percent) woman was from St. Lucia. Twenty two (55 percent) of these study participants were U.S. citizens, 13 (32.5 percent) women held visitor’s visas and five (12.5 percent) women were U.S. residents.

Study participants were also asked about their education attainment. Eleven (27.5 percent) study participants had a high school education, seven (17.5 percent) women attended nursing college in the Caribbean or the U.S., six (15 percent) women had elementary school education, six (15 percent) women had some college education, four (10 percent) women attended teacher’s college in the Caribbean, three (7.5 percent) women had an associate degree, two (5 percent) women had a bachelor’s degree, one (2.5 percent) woman has a master’s degree. The most pertinent socio-demographic characteristics are displayed in Table 9.
Table 9. Socio-Demographic Characteristics of Study Participants Diagnosed with Type 2 Diabetes

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age Category</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35 years to 39 years</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>40 years to 49 years</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>50 years to 59 years</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>60 years to 69 years</td>
<td>15</td>
<td>37.5</td>
</tr>
<tr>
<td>70 years to 79 years</td>
<td>7</td>
<td>17.5</td>
</tr>
<tr>
<td>80 years to 90 years</td>
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<td>10</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black/African-American</td>
<td>35</td>
<td>87.5</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Black Hispanic</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Country of Origin</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>19</td>
<td>47.5</td>
</tr>
<tr>
<td>Jamaica</td>
<td>16</td>
<td>40</td>
</tr>
<tr>
<td>Haiti</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Guyana</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>Curaçao</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Immigration Status</strong></td>
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<td></td>
</tr>
<tr>
<td>U.S. Citizen</td>
<td>22</td>
<td>55</td>
</tr>
<tr>
<td>Visitor’s Visas</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>U.S. Resident</td>
<td>5</td>
<td>12.5</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Widowed</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Single</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Divorced</td>
<td>5</td>
<td>12.5</td>
</tr>
<tr>
<td>Separated</td>
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<td>2.5</td>
</tr>
<tr>
<td><strong>Education Attainment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School</td>
<td>11</td>
<td>27.5</td>
</tr>
<tr>
<td>Some College/Associate Degree</td>
<td>9</td>
<td>22.5</td>
</tr>
<tr>
<td>Nursing College in Country of Origin</td>
<td>7</td>
<td>17.5</td>
</tr>
<tr>
<td>Elementary School</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Teacher College in Country of Origin</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Master’s degree</td>
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<td>2.5</td>
</tr>
<tr>
<td><strong>Income Category</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;$10,000 per year</td>
<td>13</td>
<td>32.5</td>
</tr>
<tr>
<td>$10,001 – $20,000 per year</td>
<td>5</td>
<td>12.5</td>
</tr>
<tr>
<td>$20,001 – $30,000 per year</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>$30,001 – $40,000 per year</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>$40,001 – $50,000 per year</td>
<td>7</td>
<td>17.5</td>
</tr>
<tr>
<td>&gt;$50,000 per year</td>
<td>4</td>
<td>9.65</td>
</tr>
</tbody>
</table>
The 40 study participants have varied employment and sources of incomes. Six (15 percent) study participants were retired nurses; four (10 percent) women were retired from sales, factory and domestic jobs; three (10 percent) women were retired government employees; two (5 percent) women were retired teachers; one (2.5 percent) woman was a retired banker; one (2.5 percent) woman was a retired nursing assistant; one (2.5 percent) woman was a retired self-employed business owner; and one (2.5 percent) woman was a retired seamstress. All these women had a pension which was their primary income.

Three (7.5 percent) women were registered nurses, three (7.5 percent) women were nurse assistants, two (5 percent) women were self-employed, two (5 percent) women were domestic workers, one (2.5 percent) woman was a health insurance agent, one (2.5 percent) woman was a health insurance agent who also owns her own catering business, one (2.5 percent) woman was a minister, one (2.5 percent) woman was a facilities representative for Starbucks, one (2.5 percent) woman was a teacher, one (2.5 percent) woman was a child care worker, one (2.5 percent) woman was a behavioral coach, and one (2.5 percent) woman was a housewife. Two (5 percent) study participants were currently unemployed. Twenty eight (75.68 percent) study participants stated that their family including husbands and children contributed to their household incomes. One (2.63 percent) woman received additional income from her roommate which whom she shared her rented home.

In this sample, 27.5 percent of study participants were currently or retired registered nurses or employed in health care support occupations as nursing assistants and
Therapists. Thus, the study sample is slightly over representative of women employed in the health care industry. According to the 2000 Census, in Florida 21 percent of the women of West Indian ancestry (includes Dutch and French West Indies) are registered nurses or in health care support occupations (U.S. Census Bureau 2000).

Thirty nine of the 40 study participants diagnosed with type 2 diabetes interviewed responded to the question about the number of people of their household and if they rent or owned their home. Ten (25.64 percent) of the study participants lived alone, 17 (43.59 percent) women lived with one other person, six (15.38 percent) women lived with 2 other people, four (10.26 percent) women lived with three other people and two (5.13 percent) women lived with 4 other people. Eleven (28.21 percent) study participants lived in apartments that they rented, 26 (66.67 percent) women lived in a house which owns with her family, one (2.56 percent) woman rented the house in which she lives with her family, and one (2.56 percent) woman lived in and owned a condominium.

Thirty-eight (95 percent) of the study participants lived in urban working class neighborhoods in the Tampa Bay region located between major thoroughfares. The neighborhoods span across 22 census tracts which have a median family household income of $32,553 according to the United States Census Bureau (2000). These neighborhoods are comprised of houses and apartment complexes. The streets are narrow with no sidewalks. There are no designated recreational areas for physical activity. These neighborhoods have no large upscale supermarket chains. However, there is a Wal-Mart,
two independent groceries, two pharmacies, one meat market, two large low cost produce markets, three Caribbean grocery stores and three Caribbean restaurants within 10 miles driving distance. There are no malls or large shopping areas within or nearby these neighborhoods. Study participants needed a car to travel to work as well as to the supermarkets and restaurants. Although there is public transportation in these neighborhoods, the bus routes are not conveniently located and the schedules are not regular enough to transport study participants to the supermarkets to purchase food or shopping areas.

The remaining two (5 percent) study participants lived in middle class suburban neighborhoods in north Tampa Bay. According to the United States Census Bureau (2000), the median family household income of the two census tracts in which these two neighborhoods are located is $75,611. These neighborhoods have upscale supermarket chains with ethnic food sections, upscale warehouse clubs, restaurants, pharmacies, commercial stores, and a shopping mall within a 5 mile radius. Study participants must drive to these locations because there is no public transportation.

Medical Data

For study participants, the mean age at onset of type 2 diabetes was 50.8 years with a minimum of 23 years and maximum of 80 years. The mean number of years that study participants had been diagnosed with type 2 diabetes was 11 years with a minimum of .5 years and maximum of 38 years. Nineteen (47.5 percent) women stated that the results of the last laboratory conducted blood tests showed that their glucose levels were
Thirty four (85 percent) women had a family history of type 2 diabetes. The remaining six (15 percent) women could not recall any family member having the disease. However, they ruminated that in their youth, the elder generation was secretive about their health problems and often did not go to the physician so unbeknownst to them type 2 diabetes could have been present in their family.

Twenty one (52.5 percent) of the study participants with type 2 diabetes have health insurance that partially pays for their medications and physician visits, while 19 (47.5 percent) women do not have health insurance. Of the 21 study participants with health insurance coverage, four (19 percent) women had Medicare, three (14 percent) women had Medicaid, three (14 percent) women had Etna, three (14 percent) women had Blue Cross/Blue Shield, two (9.5 percent) women had United Health and the remaining six (28.6 percent) women did not know their health insurance carrier. Nine (47.4 percent) women without health insurance pay in cash for their medications and physician visits.

To treat type 2 diabetes, 32 (80 percent) study participants are taking prescribed oral hypoglycemic agents alone, three (7.5 percent) women are taking prescribed oral hypoglycemic agents and insulin, and two (5 percent) women are taking prescribed insulin alone. Two (5 percent) women admitted that they had stopped taking their prescribed oral hypoglycemic agents because they do not like taking “pills” and were tired of type 2 diabetes. One (2.5 percent) woman claimed that her glucose levels were back to normal after she had foot ulcers removed in July 2008. She stopped taking insulin and any oral hypoglycemic agents. She considers herself cured of type 2 diabetes. The
most widely prescribed oral hypoglycemic agent to these women (55 percent) is Metformin, brand name, Glucophage. In addition to the previously mentioned biomedical treatments, 23 (57.5 percent) study participants use or have used traditional/alternative remedies to treat not only type 2 diabetes, but also high blood pressure.

The study participants diagnosed with type 2 diabetes had other medical conditions that impact their health and influence their health care decisions. Twenty seven (67.5 percent) of the study participants with type 2 diabetes had been diagnosed with hypertension and 23 (85 percent) of these women took prescribed antihypertensive agents. Fourteen (35 percent) of the study participants had been diagnosed with high cholesterol and 11 (78.5 percent) of these women took prescribed hypolipidemic agents. Five (12.5 percent) of the study participants were diagnosed with CVD and all of these women were taking prescribed medications for this condition. One (2.5 percent) woman had had a stroke in the 1990s. Although she has since recovered and is working as a nurse again, she was taking medications to lower the risk of the stroke occurring again. One (2.5 percent) woman was diagnosed with chronic renal failure five years before she was diagnosed with type 2 diabetes in 1990. For the last three years, she has been going to a clinic for dialysis three times a week. Five (12.5 percent) study participants were either legally blind or had severely impaired vision. Table 10 displays the medical conditions of the 40 study participants with type 2 diabetes.
Table 10. Medical Conditions of 40 Study Participants Diagnosed with Type 2 Diabetes

<table>
<thead>
<tr>
<th>Medical Conditions</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>27</td>
<td>67.5</td>
</tr>
<tr>
<td>High Cholesterol</td>
<td>14</td>
<td>35</td>
</tr>
<tr>
<td>CVD</td>
<td>5</td>
<td>12.5</td>
</tr>
<tr>
<td>Blindness/Impaired Vision</td>
<td>5</td>
<td>12.5</td>
</tr>
<tr>
<td>Chronic Renal Failure</td>
<td>1</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Beliefs and Behavioral Characteristics

All of the 40 study participants identified their religion as Christian. Twenty seven (67.5 percent) of the study participants go to church services every Sunday or more than once a week, six (15 percent) women rarely attended church services, four (10 percent) of the women attended to church services infrequently, two (5 percent) women attended church services almost every Sunday, and one (2.5 percent) woman preferred not to talk about her church attendance.

Only one (2.5 percent) of the study participants smoked and she has tried to reduce the number of cigarettes that she smoked a day (2 cigarettes). Six (15 percent) of the study participants drink alcohol socially or infrequently.
Characteristics of Study Participants without Type 2 Diabetes

Of the 10 study participants without type 2 diabetes interviewed for this study, the mean age was 56 years with a minimum age of 35 years and maximum age of 71 years. Nine (90 percent) of these women reported their ethnicity as black or African-American and one (10 percent) woman reported her ethnicity as “mixed.” Six (60 percent) of these study participants were married, two (20 percent) women were divorced, one (10 percent) woman was single and one (10 percent) woman was widowed. Eight (80 percent) of these study participants were from Trinidad and Tobago, one (10 percent) woman was from Grenada and one (10 percent) woman was from Jamaica. Five (50 percent) of these study participants were U.S. citizens, four (40 percent) women held visitor’s visas and one (10 percent) woman was a U.S. resident.

Research Question 1

Do Study Participants share a cultural belief model about type 2 diabetes?

To identify if there is an explanatory model about type 2 diabetes among 30 study participants who responded to the cultural consensus questionnaire, the cultural consensus analysis was performed in ANTHROPAC 4.98. The cultural consensus questionnaire was developed from the analysis of free list questions, the preliminary semi-structured interviews, and research on Afro-Caribbean beliefs about the disease conducted in the United Kingdom. Of the 30 study participants who responded to the cultural consensus questionnaire, 7 study participants had medical education/training and 23 study participants did not have medical education/training. Consequently, the cultural
consensus analysis was run on separately on the study participants who had medical education/training and study participants who *did not have* medical education/training to determine if there was a difference between their cultural belief models about type 2 diabetes.

*Cultural Consensus Analysis*

The cultural consensus analysis showed that the 30 study participants diagnosed with type 2 diabetes shared a single cultural belief model about the prevention, causes, symptoms, complications, and treatment of the disease. The ratio of the first to second eigenvalue of the factors was 7.498 to 1 which is > 3 to 1 ratio required to meet the goodness of fit criteria for the consensus model. The first eigenvalue was 15.739, second eigenvalue was 2.099, and the third eigenvalue was 1.135. There was no response bias as the match method and covariance method resulted in almost the exactly same eigenvalues. The first factor explained 83 percent of the variation of the study participants’ cultural beliefs about type 2 diabetes. The mean cultural knowledge i.e., the shared cultural beliefs of the study participants was .72 (±.081 SD). Consequently, the homogeneous cultural beliefs about type 2 diabetes are shared by 72 percent of the study participants (Weller 1987).

Seven (23 percent) of the 30 study participants responding to the cultural consensus questionnaire had a medical training or education. To determine if medical education/training of study participants resulted in differing cultural belief models, the cultural consensus analysis was run separately on the 23 study participants without
medical education/training and the seven study participants with medical education/training.

The cultural consensus analysis found that both the study participants with and without medical education/training shared a single belief model about type 2 diabetes. The ratio of the 1st eigenvalue to the 2nd eigenvalue was 3 to 1 for both groups of study participants. The ratio of the first to second eigenvalue for the study participants without medical education/training was higher, 7.594 to 1, than the ratio for study participants with medical education/training, 7.237 to 1. For study participants without medical education/training, the first factor explained 83 percent of the variation of cultural beliefs about type 2 diabetes which is exactly the same as for the total 30 study participants. For study participants with medical education/training, the first factor explained 87.7 percent of the variation of cultural beliefs about type 2 diabetes. The higher variance is to be expected since this sample is smaller, therefore, it has a higher level of agreement. However, the mean cultural knowledge of the study participants with and without medical education/training were similar .73 (±.087 SD) and .721 (±.081 SD) respectively. The results of the cultural consensus analysis are presented in Table 11.
Table 11. Results of Cultural Consensus Analysis

<table>
<thead>
<tr>
<th>Factor</th>
<th>Eigenvalue</th>
<th>Ratio between 1st and 2nd Eigenvalue</th>
<th>Variance explained % by factors</th>
<th>Mean Cultural Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 study participants</td>
<td>1</td>
<td>15.739</td>
<td>7.500</td>
<td>83.0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2.099</td>
<td></td>
<td>11.1</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1.135</td>
<td></td>
<td>6.0</td>
</tr>
<tr>
<td>7 study participants with medical training</td>
<td>1</td>
<td>3.785</td>
<td>7.237</td>
<td>87.7</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>.528</td>
<td></td>
<td>12.3</td>
</tr>
<tr>
<td>23 study participants without medical training</td>
<td>1</td>
<td>12.098</td>
<td>7.594</td>
<td>83.0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1.593</td>
<td></td>
<td>10.9</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>.881</td>
<td></td>
<td>6.0</td>
</tr>
</tbody>
</table>

The Student’s t-test met the assumptions and found that there was no statistically significant difference between the means of the individual cultural knowledge scores of study participants with medical education/training and study participants without medical education/training ($t = .25$, $p = .8066$, df = 28).

The Spearman correlation analysis of found there was a significantly negative correlation between study participants’ age at type 2 diabetes diagnosis and individual cultural knowledge scores ($r_s = -0.41730$, $p = .0218$). Study participants with higher individual cultural knowledge scores were younger at age of type 2 diabetes diagnosis than study participants with lower individual cultural knowledge scores. However, the Spearman correlation analysis showed no significant relationship between the individual cultural knowledge scores and age, years of type 2 diabetes duration, years of education,
and length of time in the U.S. Table 12 displays the results of the Spearman correlation analysis.

Table 12. Spearman Correlation Analysis Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>$r_s$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-0.22355</td>
<td>0.2350</td>
</tr>
<tr>
<td>Age at Type 2 Diabetes Diagnosis</td>
<td>-0.41730</td>
<td>0.0218</td>
</tr>
<tr>
<td>Years of Type 2 Diabetes Duration</td>
<td>0.29401</td>
<td>0.1148</td>
</tr>
<tr>
<td>Years of Education</td>
<td>0.32204</td>
<td>0.0826</td>
</tr>
<tr>
<td>Length of Time in the U.S.</td>
<td>0.17093</td>
<td>0.3665</td>
</tr>
</tbody>
</table>
To further examine the relationships between the individual cultural knowledge scores and the socio-demographic variables, scatter plots were created and interpreted. Figure 4 shows the significant relationship between study participants’ individual cultural knowledge scores and age at type 2 diabetes diagnosis. Consistent with the significant finding of the Spearman correlation analysis, the scatter plot indicates that most of the study participants with higher individual cultural knowledge scores were younger at the age at type 2 diabetes diagnosis than their counterparts who had lower individual cultural knowledge scores.

Figure 4. Age at Type 2 Diabetes Diagnosis and Cultural Knowledge Scores
Figure 5 shows the relationship between study participants’ age and individual cultural knowledge scores. Although these two variables do not have a significant relationship, the scatter plot suggests that younger study participants have the higher individual cultural knowledge scores than their older counterparts. Since these younger women were also younger at the age of type 2 diabetes diagnosis, this observation is consistent with the significant finding that these women have higher individual cultural knowledge scores than their older counterparts.

Figure 5. Age and Individual Cultural Knowledge Scores
Figure 6 shows the relationship between study participants’ years of type 2 diabetes duration and individual cultural knowledge scores. With the exception of two individuals, study participants with type 2 diabetes diagnosis duration ≤ 15 years had lower individual cultural knowledge scores than their counterparts with the disease for over 15 years. Women who had type 2 diabetes for over 15 years had the higher individual cultural knowledge scores.

Figure 6. Years of Type 2 Diabetes Duration and Cultural Knowledge Scores
Figure 7 shows the relationship between study participants’ individual cultural knowledge scores and years living in the U.S. Study participants who have lived in the U.S. from 11 to 40 years have the highest individual cultural knowledge scores. The lower individual cultural knowledge scores are found among women who had lived in the U.S. for \( \leq 25 \) years. Length of time living the U.S. may have no influence on individual cultural knowledge scores given the inclusion of women with medical training and women who engaged in transnational migration in this small sample.

![Figure 7. Years Living in the U.S. and Cultural Knowledge Scores](chart.png)
Figure 8 shows the relationship between study participants’ years of education and individual cultural knowledge scores. The highest individual cultural knowledge scores are found among women who had graduated from high school and had additional years of education. Since most of these women were nurses, health care workers and teachers, this finding is expected.

Figure 8. Years of Education and Individual Cultural Knowledge Scores

**Cultural Belief Model about Type 2 Diabetes**

Study participants’ shared cultural belief model about type 2 diabetes’ etiology, treatment, and symptoms identified by the cultural consensus analysis converges with the
biomedical model, especially in regards to causation. Study participants overwhelmingly considered type 2 diabetes to be hereditary. However, they believed that the onset maybe preventable or delayed by eating the right foods, not eating too many starches, staying away from fast foods, losing weight, and exercising regularly. A 46 year old domestic worker stated, “As we know they say diabetes is hereditary, but yet still if you eat properly and take care your body and exercise daily, you can prevent yourself from getting diabetes.” She went on to add, “starches turn to sugar and sugar really don’t give you diabetes. It is too many fatty foods that give you diabetes.” A 59 year old retired nursing assistant offered, “if the physician tells you that you are a potential candidate, you could change your lifestyle maybe. If you are inclined, prone to diabetes, it might just retard it for awhile, but it will eventually show up.” Study participants referred to health care practitioners and television shows as additional sources of their knowledge about type 2 diabetes.

Study participants did not believe that living in the Caribbean would have prevented them from developing type 2 diabetes or that living the U.S. caused them to develop the disease. A 47 year old nurse stated, “My family on both sides have it, but I think being in the U.S. attributed to it. Maybe I found out faster.” In addition to being hereditary, these women linked type 2 diabetes causation to an improperly functioning pancreas and gestational diabetes.

Study participants reported the symptoms of type 2 diabetes as the following: frequent urination, thirst and drinking water, dizziness, excessive sweating and hunger,
loss of weight, fatigue and the lack of energy, vaginal infections, numbness of feet and toes, wounds heal slowly, and poor eye sight. A 38 year old independent health insurance agent described her symptoms:

   My eyesight started getting worse and I didn’t understand what that was about and actually that was the last thing when I decided I needed to go to the doctor. But I was extremely, extremely thirsty like and the funny thing is after, in hindsight after finding out I was diabetic I knew I was doing the wrong thing because I was just drinking juice like crazy…

She described more symptoms:

   Oh and then I was losing weight. I lost a lot of weight; all of a sudden I just started losing weight. Cuz I went up to, that was another thing that triggered it I believe because I normally stay at 135, that’s my ideal weight, I think that’s my ideal weight, probably 130 is my ideal weight but I was at 135 and then there was a year within a period of time I gained twenty pounds so I was like 150… And then when I was sick I was just losing weight like, I must’ve gotten down to at least 120, I was really anorexic or something was wrong with me, very ill.

Slightly more than half of the women (53 percent) believed that if ants followed urine it meant that someone has type 2 diabetes. A 56 year old minister stated, “because your urine is usually sweet. I’ve experienced it a lot of times.” A 36 year old independent health insurance agent stated, “I know that have heard it before I can’t tell exactly where I heard it, but my niece is exactly studying to be a pediatrician and she said if your urine has a sweet smell that is a sign.”

The complications of type 2 diabetes agreed upon by study participants included amputation of lower limbs and feet, kidney failure, declining eye sight and cataracts, diabetic coma, heart failure and disease, stroke, gum disease, and unhealthy skin. A 71
year old retired machine operator recalled how type 2 diabetes took the life of a loved one:

They tell you don’t walk barefoot. Always keep something on your foot because the diabetes have your foot numb at times. And that is one of the reasons why I lost my sister-in-law. Something stuck her in her foot and she did not know. It started to get infectious. They had to scrap until she lost the foot. It was on her flesh and she didn’t know. That is a common cause. You must be alert and examine your foot and take care of toes.

Study participants believed that the most effective treatments of type 2 diabetes were insulin, medication (tablets), a diet low in starches and sugar, exercising regularly, losing weight, the complementary use of traditional/alternative remedies, and prayer and faith. The women did not believe having a Caribbean diet with traditional foods helped control type 2 diabetes. Table 13 illustrates the study participants’ strongest shared cultural beliefs about type 2 diabetes based on responses to cultural consensus analysis questionnaire.
Table 13. Shared Cultural Beliefs of 30 Afro-Caribbean Women

<table>
<thead>
<tr>
<th>Beliefs about Type 2 Diabetes</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prevention</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating right</td>
<td>20</td>
<td>66.66</td>
</tr>
<tr>
<td>Can be prevented</td>
<td>19</td>
<td>63.33</td>
</tr>
<tr>
<td>Exercise regularly</td>
<td>20</td>
<td>66.66</td>
</tr>
<tr>
<td>Living in Caribbean does not prevent</td>
<td>24</td>
<td>80</td>
</tr>
<tr>
<td><strong>Causation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hereditary</td>
<td>29</td>
<td>96.66</td>
</tr>
<tr>
<td>Pancreas not working</td>
<td>29</td>
<td>96.66</td>
</tr>
<tr>
<td>Living the U.S. does not cause</td>
<td>25</td>
<td>83.33</td>
</tr>
<tr>
<td>Gestational diabetes</td>
<td>20</td>
<td>66.66</td>
</tr>
<tr>
<td>Some medications do not cause</td>
<td>22</td>
<td>73.33</td>
</tr>
<tr>
<td><strong>Symptoms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequent urination</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>Thirst and drinking lots of water</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>Dizziness</td>
<td>24</td>
<td>80</td>
</tr>
<tr>
<td>Excessive sweating</td>
<td>20</td>
<td>66.66</td>
</tr>
<tr>
<td>Loss of weight</td>
<td>25</td>
<td>83.33</td>
</tr>
<tr>
<td>Fatigue and no energy</td>
<td>29</td>
<td>96.66</td>
</tr>
<tr>
<td>Vaginal infections</td>
<td>20</td>
<td>66.66</td>
</tr>
<tr>
<td>Very hungry</td>
<td>29</td>
<td>96.66</td>
</tr>
<tr>
<td>Wounds heal slowly</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>Numbness of fingers and toes</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>Poor eye sight</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td><strong>Complications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amputation of lower leg and feet</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>Kidney failure</td>
<td>28</td>
<td>93.33</td>
</tr>
<tr>
<td>Declining eye sight</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>Poor heart function</td>
<td>27</td>
<td>90</td>
</tr>
<tr>
<td>Coma</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>High blood pressure</td>
<td>22</td>
<td>73.33</td>
</tr>
<tr>
<td>Heart attack</td>
<td>29</td>
<td>96.66</td>
</tr>
<tr>
<td>Stroke</td>
<td>27</td>
<td>90</td>
</tr>
<tr>
<td>Gum disease</td>
<td>27</td>
<td>90</td>
</tr>
<tr>
<td>Skin problems</td>
<td>26</td>
<td>86.66</td>
</tr>
<tr>
<td>Cataracts</td>
<td>28</td>
<td>93.33</td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulin</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>Medication (tablets)</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>Diet low in starches and sugar</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>Exercising regularly</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>Not gaining weight</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>Alternative medications</td>
<td>24</td>
<td>80</td>
</tr>
<tr>
<td>Prayer</td>
<td>27</td>
<td>90</td>
</tr>
<tr>
<td>Caribbean diet not good</td>
<td>23</td>
<td>76.66</td>
</tr>
</tbody>
</table>
**Research Question 2**

**What cultural beliefs about type 2 diabetes influence how study participants make lifestyle and health care decisions?**

To determine the cultural beliefs that influence how study participants diagnosed with type 2 diabetes make lifestyle and health care decisions, the responses to the 40 socio-demographic/medical/behavioral questionnaires, the narratives along with the responses to the 30 cultural consensus analysis questionnaires, and the 38 semi-structured interviews were analyzed for patterns and themes. These themes involve study participants reconciling traditional Caribbean beliefs and practices with the biomedical model of type 2 diabetes management. The themes identified were the efficaciousness of traditional/alternative remedies, modification of traditional Caribbean diet, and the importance of prayer and faith. These themes about study participants’ cultural beliefs focus on the most effective ways to manage type 2 diabetes on a daily basis. These themes are presented next.

*Efficaciousness of Traditional/Alternative Remedies*

The efficaciousness of traditional/alternative remedies was a theme identified through the analysis of the 40 responses to the socio-demographic/medical/behavioral questionnaire. In total, 23 (57.5 percent) of 40 study participants diagnosed with type 2 diabetes believed that using traditional/alternative remedies could effectively control their glucose levels. Study participants who use traditional/alternative remedies believed that they are not only effective in controlling type 2 diabetes, but also other medical
conditions such as high blood pressure, high cholesterol and other complications like bad circulation. Consequently, these women often used a combination of traditional/alternative remedies to treat a variety of medical conditions as well as their overall well being. Although study participants believed that these traditional/alternative remedies were helpful to control their glucose levels, they admitted that they took them intermittently depending on cost or availability or how their body felt at the moment.

The frequencies of study participants’ age, years of type 2 diabetes duration, education attainment, income, country of origin, medical training, transnational migration, and length of time in the U.S. were examined to determine if these socio-demographic variables influenced the belief that traditional/alternative remedies were an effective treatment for type 2 diabetes. After examining the frequencies of these socio-demographic variables and the belief of traditional/alternative remedies, the Fisher exact test was conducted to determine any statistic significance between these variables.

Table 14 shows that the Fisher exact test found no statistically significant relationships between the belief that traditional/alternative remedies are effective treatments of type 2 diabetes and the socio-demographics variables: age, years of type 2 diabetes duration, education attainment, income, country of origin, medical training, transnational migration, and length of time in the U.S.
Table 14. Fisher Exact Test Results: Traditional/Alternative Remedies

<table>
<thead>
<tr>
<th>Variables</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.6477</td>
</tr>
<tr>
<td>Years of Type 2 Diabetes Duration</td>
<td>0.1897</td>
</tr>
<tr>
<td>Education Attainment</td>
<td>0.4006</td>
</tr>
<tr>
<td>Income</td>
<td>0.7940</td>
</tr>
<tr>
<td>Country of Origin</td>
<td>0.5984</td>
</tr>
<tr>
<td>Medical Training</td>
<td>0.2960</td>
</tr>
<tr>
<td>Transnational migration</td>
<td>1</td>
</tr>
<tr>
<td>Length of Time in the U.S.</td>
<td>1</td>
</tr>
</tbody>
</table>

Of the 23 study participants who believed that traditional/alternative remedies were an effective treatment for type 2 diabetes, eight (34.78 percent) women were 60 to 69 years of age and five (21.74 percent) women were 70 to 79 years of age. Nine (39.13 percent) of these study participants had been diagnosed with type 2 diabetes for <10 years, nine (39.13 percent) women had been diagnosed for >30 years, and five (21.74) women had been diagnosed for 10 to 30 years. Nine (39.13 percent) of study participants who believed that traditional/alternative remedies were an effective treatment for type 2 diabetes had some college or had completed a degree and another nine (39.13 percent) study participants had less than a high school education. The lowest proportion five (21.74 percent) of study participants who believed that traditional/alternative remedies were an effective treatment for type 2 diabetes attended teacher or nursing college in the Caribbean.
The highest proportion (47.82 percent) of study participants who believed that traditional/alternative remedies were an effective treatment for type 2 diabetes had incomes less than $20,000. Examining the country of origin showed that similar proportions of Jamaicans (56 percent) and Trinidadians (58 percent) who comprised the majority of study participants believed that traditional/alternative remedies could help control their glucose levels. The highest proportion (78.26 percent) of study participants who believed that traditional/alternative remedies were an effective treatment for type 2 diabetes did not have medical training. Nine (60 percent) of the 15 study participants who have lived or spent substantial time in the U.S. for less than 30 years believed that traditional/alternative remedies could treat type 2 diabetes. A higher proportion (65.22 percent) of study participants who did not engage in transnational migration believed that traditional/alternative remedies could effectively control their glucose levels. Table 15 illustrates the characteristics of the 23 study participants who believed that traditional/alternative remedies were an effective treatment for type 2 diabetes.
Table 15. Study Participants who used Traditional/Alternative Remedies

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35 years to 39 years</td>
<td>2</td>
<td>8.7</td>
</tr>
<tr>
<td>40 years to 49 years</td>
<td>3</td>
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<td>50 years to 59 years</td>
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<td>13.04</td>
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<td>60 years to 69 years</td>
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<td>70 years to 79 years</td>
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</tr>
<tr>
<td>80 years to 90 years</td>
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</tr>
<tr>
<td><strong>Diabetes Duration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10 years</td>
<td>9</td>
<td>39.13</td>
</tr>
<tr>
<td>10 to 30 years</td>
<td>5</td>
<td>21.74</td>
</tr>
<tr>
<td>&gt;30 years</td>
<td>9</td>
<td>39.13</td>
</tr>
<tr>
<td><strong>Education</strong></td>
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<td></td>
</tr>
<tr>
<td>&lt;High School</td>
<td>9</td>
<td>39.13</td>
</tr>
<tr>
<td>Some College/College Degree</td>
<td>9</td>
<td>39.13</td>
</tr>
<tr>
<td>Teacher/Nursing College</td>
<td>5</td>
<td>21.74</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;$20,000</td>
<td>11</td>
<td>47.82</td>
</tr>
<tr>
<td>$20,000 to $50,000</td>
<td>8</td>
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</tr>
<tr>
<td>&gt;$50,000</td>
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<td><strong>Country of Origin</strong></td>
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<td>Trinidad</td>
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<td>Jamaica</td>
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<td>Haiti</td>
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<tr>
<td>St. Lucia</td>
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<td><strong>Medical Training</strong></td>
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<tr>
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<td>5</td>
<td>21.74</td>
</tr>
<tr>
<td>No</td>
<td>18</td>
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<tr>
<td><strong>Length in the U.S.</strong></td>
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<td></td>
</tr>
<tr>
<td>&lt;30 years</td>
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<tr>
<td>&gt;30 years</td>
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<td><strong>Transnational migration</strong></td>
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<tr>
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<td>8</td>
<td>34.78</td>
</tr>
<tr>
<td>No</td>
<td>15</td>
<td>65.22</td>
</tr>
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</table>
The main traditional Caribbean medicines or remedies used to treat type 2 diabetes identified by the 23 study participants were cerasse/noni/caraili/bitter melon (*Momordica charantia*), cinnamon bark and pills (*Cinnamomum verum*), mauby bark (*Colubrina arborescens*), aloe (*Aloe vera, Aloe barbadensis*), bush tea (unspecified medicinal plants) and celery (*Apium graveolens*). Study participants mentioned that they also used cucumber (*Cucumis sativus*), garlic (*Allium sativum L.*), and tamarind leaf (*Tamarindus indica*) to control high blood pressure. These plants were usually crushed, liquefied and drunk or steeped as a brewed tea. Table 15 displays the traditional Caribbean medicines or remedies used by study participants to control type 2 diabetes.

**Table 16. Frequently Used Traditional/Alternative Caribbean Remedies**

<table>
<thead>
<tr>
<th>Plants</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerasse/noni/caraili/bitter melon</td>
<td>9</td>
<td>39</td>
</tr>
<tr>
<td>(<em>Momordica charantia</em>)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cinnamon bark/pills</td>
<td>9</td>
<td>39</td>
</tr>
<tr>
<td>(<em>Cinnamomum verum</em>)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mauby bark</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>(<em>Colubrina arborescens</em>)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aloe Vera</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>(<em>Aloe vera, Aloe barbadensis</em>)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bush tea (unspecific plants)</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>Celery</td>
<td>2</td>
<td>8.7</td>
</tr>
<tr>
<td>(<em>Apium graveolens</em>)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cerasse/noni/caraili/bitter melon (*Momordica charantia*) is the most popular traditional/alternative remedy treatment used for type 2 diabetes. It was a widely shared
belief that caraili being “bitter” made it effective in controlling type 2 diabetes. When asked why she uses caraili, a 46 year old domestic worker responded:

It helps keep the blood sugar down because caraili is a bitter thing. The green leaf herbs helps, anything green and leafy that you can blend, that you can juice, that you can drink, it helps bring down the sugar level.

A 65 year old retired business owner stated:

I have done all of it. We come from the islands, I always take the bush and all that. We still have to take the insulin still. I do not do much herbal any more, I do what my physician says. I still drink the cerasse, not specifically for diabetes, but because I know that it is good for the blood. Cerasse is very good. I drink it as a tea. It is very bitter, but it is good for you. It runs wild in Florida. You can pick it there.

Cinnamon (*Cinnamomum verum*) in its original form as well as in a powder and capsule form was also frequently mentioned as an effective way to control glucose levels. A 64 year old daycare owner stated that she used cinnamon in any of its forms because it “helps to normalize the sugar.” Mauby bark (*Colubrina arborescens*) is typically used to make a bitter cold drink with sugar. Study participants who used the mauby bark to treat type 2 diabetes did not put sugar in the drink. They also occasionally would steep the mauby bark in a hot water and drink it like a hot tea without sugar. Aloe vera was considered to be good not only for controlling glucose levels, but also improving health overall. Study participants said that they cut, peeled, and crushed the leaf of the aloe vera plant, and then drank the liquid, cold without sugar.

Study participants also used commercially produced herbal therapies and supplements purchased from pharmacies and grocery stores to treat type 2 diabetes, high cholesterol, high blood pressure, and improve their overall health. These herbal therapies
and supplements include Super Greens (46 herbs powder), Xango, Genesis Today-4 Fiber, Transfer Factor-4life, diabetic vitamins, Fenugreek, Alpha-lipoic acid, GNC garlic, apple tea, Chinese herbal teas (dandelion, Gohyah – bitter melon, Oolong Xiaoket, Jiaogulan), and Promise Super Shots. However, women stated that they took these supplements and therapies sporadically because their prices were exorbitant and they were uncertain about their effectiveness. A 64 year old retired nurse recalled:

They were pushing a type of treatment that I took for two months, I can’t even remember the name [Chelation Therapy], it was so many [8] years ago. But I found I was spending a whole lot of money because it was expensive and I wasn’t getting any results. It was something that we saw in the papers and I decided that I would try it. It was $75 a month. So I said, why am I wasting my money? I am on a fixed income and cannot afford continue to spend that kind of money without any kind of positive outcome.

A 67 retired domestic worker stated:

At one point, I was using this thing called Genesis. It is not really for diabetes alone. It was for different things. But I stopped because it was a little sweet to me and I just did want to make anything worse, drinking it every day. I’m not really taking anything any more, just the two pills [Metformin].

Almost all study participants who used traditional/alternative remedies viewed them as complementary to prescribed medicines. They believed that using these traditional/alternative remedies would eventually wean them off prescribed medicines. However, two women stated that currently they only used traditional/alternative remedies to treat type 2 diabetes. One 46 year old domestic worker had stopped taking prescribed Metformin because it made her sick and she now only uses traditional/alternative remedies to manage her glucose levels. Another 50 year old certified nursing assistant
stopped taking prescribed Janumet because it was too expensive and not covered by her health insurance. She is now using cinnamon alone to control her glucose levels.

Study participants got advice from family members and friends who had experience with type 2 diabetes or drew from their own memories from their home countries to decide which traditional/alternative remedies are efficacious. They also did research at the library, on Internet or watching television medical segments to identify traditional/alternative remedies to treat type 2 diabetes. A 36 year old facilities representative at Starbucks stated, “one of my husband’s friends at work, he is a diabetic and he’s been drinking three different Chinese teas mixed together.” She went to explain that she had decided to use the same traditional/alternative remedy because he had looked it up on the Internet and had found that the teas individually lowered sugar levels, helped with bad circulation, digestion, and liver.

The 16 study participants who did not use traditional/alternative remedies expressed skepticism about their usefulness for controlling type 2 diabetes and believed that they could even be dangerous. These women were guided by their physicians’ advice. An 80 year old retired government clerk who did not use any traditional/alternative remedies expressed doubtfully, “a lot of people believe in the caraili so maybe they are getting some relief from it, I don’t know.” Women with medical training relied on their experience in rejecting the use of these traditional/alternative remedies. A 59 year old retired nursing assistant stated that the effectiveness of traditional/alternative remedies, “I think, that it is all in the mind.” A 66 retired year old
nurse stated, “no, that’s dangerous. It can mask the situation. You think that all is well, but all might not be well.” A 70 year old nurse who uses a supplement (she could not recall the name) purchased from the pharmacy and had stopped using cerasse stated, “I was told that when you take the cerasse, it masks the blood so you don’t know if it is really working.” Twenty three of the 40 study participants advocated the use of traditional/alternative remedies to complement the use of biomedicines to treat type 2 diabetes.

The efficaciousness of traditional/alternative remedies theme reflects the cultural belief among most study participants in this study that traditional Caribbean medicines as well as commercially produced therapies and supplements are effective remedies to achieve glucose control. This cultural belief influences how these women manage type 2 diabetes as they make decisions about which traditional/alternative remedies they should ingest on daily basis. While study participants have doubts about the effectiveness of these traditional/alternative remedies, they continue to use them though some traditional Caribbean medicines are not always readily available and prices of commercially produced therapies and supplements are sometimes prohibitive and more costly than prescribed oral hypoglycemic agents. This cultural belief about the efficaciousness of traditional/alternative remedies is an integral part of the study participants’ belief model about type 2 diabetes management.
Modification of Traditional Caribbean Diet and Lifestyle

The modification of traditional Caribbean diet was a major theme that emerged from the data analysis. Study participants struggled to reconcile the biomedical recommendations for effective management of type 2 with their preferred Caribbean diet. In response to the Cultural Beliefs about Type 2 diabetes questionnaire, 23 (77 percent) study participants reported traditional Caribbean diets comprised of prepared meals like pelau (rice and peas with coconut milk), callaloo, ackee and saltfish, stewed meats and curries were not helpful in controlling type 2 diabetes. In the interviews with the 40 study participants with type 2 diabetes, the women explained that they considered traditional Caribbean diets to be high in starches, sugars, and fat content. Additionally, they stated that large portion sizes per meal further exacerbated and undermined their ability to control and maintain healthy glucose levels. One 74 year old retired teacher stated, “when you look at our diet, it is filled with starches, a lot of starches.” One 74 year old retired teacher concurred, “if you are eating Caribbean foods as we know it, it is not going to help. You have to change your lifestyle and the way you cook it.”

Table 16 shows that the Fisher exact test found no statistically significant relationships between the cultural belief that a modified traditional Caribbean diet was an effective treatments of type 2 diabetes and the socio-demographics variables: age, years of type 2 diabetes duration, education attainment, income, country of origin, medical training, transnational migration, and length of time in the U.S.
Table 17. Fisher Exact Test Results: Traditional Caribbean Diets

<table>
<thead>
<tr>
<th>Variables</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.5248</td>
</tr>
<tr>
<td>Years of Type 2 Diabetes Duration</td>
<td>0.7989</td>
</tr>
<tr>
<td>Education Attainment</td>
<td>0.5569</td>
</tr>
<tr>
<td>Income</td>
<td>0.6726</td>
</tr>
<tr>
<td>Country of Origin</td>
<td>0.0454</td>
</tr>
<tr>
<td>Medical Training</td>
<td>0.6969</td>
</tr>
<tr>
<td>Transnational migration</td>
<td>0.2725</td>
</tr>
<tr>
<td>Length of Time in the U.S.</td>
<td>0.3525</td>
</tr>
</tbody>
</table>

Although study participants stated that they knew that they needed to reduce the amount of starches, sugars, fat that they consumed in accordance to the diet guidelines in the biomedical model to effectively treat type 2 diabetes, they were more focused on how to modify a traditional Caribbean diet rather than eliminating the offending foods. Woven throughout their comments was the need to balance eating healthier Caribbean foods like green vegetables, eating brown rice, chicken, and fish over pork and red meat and eschew eating starchy sugary fruits like mangoes, apples and breadfruits. Most study participants frequently mentioned the term, “moderation” i.e., portion control of foods which allowed them to continue eat traditional Caribbean dishes. A 56 year old minister stated:

Eat everything in moderation. Like black, fruit cake, I love black cake, but I will eat a small piece with Christmas is coming, it is the greatest challenge that I have, but I have to so I am psyching up myself. There is nothing that I cannot eat, but it is moderation and not too often. I may eat ice cream once a month, maybe twice, and just a scoop.
A 66 year old retired nurse agreed, “Caribbean food is good in moderation, everything in moderation.” A 69 year old retired saleswoman insisted, “I do not go on a diet. Anything I cook, I eat the same thing that I cook for everybody. I do not eat that much.” A 65 year old retired business owner stated, “Trinidadian food is good for the diabetes, but it is the amount you put on your plate.” A 70 year old nurse stated, “do not over do it.” A 64 year old nurse stated, “anything in moderation, those things I don’t eat them regularly and in a small amount.” Study participants developed diets that incorporated moderate amounts of traditional Caribbean foods, prepared in traditional ways or modified to reduce fat content. Table 17 displays the numbers and percentages of study participants who suggested modifications of the traditional Caribbean diet.

**Table 18. Study Participants Recommendations to Modify Caribbean Diet**

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eliminate sugar intake</td>
<td>30</td>
<td>75</td>
</tr>
<tr>
<td>Control consumption of sweet deserts</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>Control consumption of starches</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>Reduce salt and fat in traditional Caribbean meals</td>
<td>33</td>
<td>82.5</td>
</tr>
<tr>
<td>Eat more fruits and vegetables</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>Eat more fish, chicken, and beans</td>
<td>37</td>
<td>92.5</td>
</tr>
</tbody>
</table>
Figure 15 illustrates the modified Caribbean diet described by study participants.

Figure 15. Modified Caribbean Diet Described by Afro-Caribbean Women

Despite their efforts to modify their diets, study participants were unsure if they were consuming appropriate portion sizes and admitted that they frequently ate large amounts of undesirable traditional Caribbean foods, particularly starches like white rice. They were often unsuccessful in controlling their portion sizes. Women mentioned how difficult it was to substitute brown rice and bread for white rice and bread which are staples of the traditional Caribbean diet. The 30 (75 percent) study participants who lived in a household with others stated that their family was supportive of their attempts to
modify their diets, but it was difficult for them to adjust to their altered diets. A 59 year old nursing assistant stated:

It’s difficult when you see I have to cook for the others I’m not cooking two pots. So I will cook and start to take out mine before I season theirs. You understand? But not always I’ll do that, sometimes in a hurry I’ll just cook pelau or soup you know but most of the times I cook enough for me to have for two, three days.

A 47 year old nurse stated:

My husband is a chef and that makes it hard because he gets kind of upset when I don’t eat because he doesn’t, he doesn’t understand. You have to understand that he wants to see me eat but he gets upsets when he cooks and I don’t eat it. He thinks it’s an insult you know? But I tell him you know it’s not good for me. I think he’s beginning to understand what I’m saying.

In contrast, seven (23 percent) study participants believed that traditional Caribbean diet and lifestyle was very positive for managing type 2 diabetes. They believed that if they still lived in their country of origin that they would not have developed type 2 diabetes. They also believed that they would be able to better manage type 2 diabetes if they still lived in their country of origin. They reminisced about eating healthier foods and walking everywhere when they were back in their country of origin.

A 64 year old daycare owner stated:

The food is not the same. In Jamaica we had a lot of food that we ate that came from the earth and most of our food is not as starchy as what we get here. We have different fruits and vegetables that we have in Jamaica that we don’t get here.

A 50 year old self-employed businesswoman whose two sisters did not have type 2 diabetes reflected:

The way we live at home is totally different. We take breaks to eat, then you don’t work long hours, less stress. You have time for yourself. We entertain ourselves
more, go to the beach, go visit friends, you take a vacation, here there is no
vacation if you are self-employed. I honestly do not think that I would have had
diabetes if I was back [home]. And the food is different. We don’t eat a lot of
McDonalds, or eat out on the road. It isn’t just the food, it is the way that we eat.
We do not have heavy dinner. You don’t go to sleep with a big all fat stomach.
We have our heavy meal at lunch time so you get time to digest all that food.
At dinner time, you eat a sandwich.

Distressed she went on to say:

When I moved here, in a couple months, I gained almost 20 pounds. Food here is
so inexpensive. Back home food is expensive so you chop up a chicken leg. Here
everything is done McDonalds is only for parties or if you want to treat yourself
at the end of month. Fast food is not an everyday thing. Fast food is the one that
really messes up people here… and I notice here that my kids eat out because I eat
out. I don’t like to cook. I think that it all comes back to your diet.

These study participants stressed not only the belief that their diet would be better in their
home countries, but also that they engaged in more physical activity during daily
activities. A 47 year old nurse stated:

I think that back home you get more exercise because you don’t drive one block.
When you are going out, you walk. Here you drive everywhere. There you get
some exercise. Here you don’t get any.

A 36 year old retired independent health insurance agent concurred:

Back home I was more active. We did a lot more, I would not say exercise, but we
walked a lot more. Our foods were a little more natural. It wasn’t as processed as
it is now. Back home a lot of foods came from the earth, we had our own fruit
trees. A lot of the stuff that we ate and drink, I think it was good for you, but we
did a lot more walking.

It should be noted that these women were the only ones to bring up about
importance of physical activity in their type 2 diabetes management. Other than 3 study
participants, a 67 year old retired saleswoman who exercised daily at the gym, a 64 year
old retired nurse woman who walked on a treadmill at her home, and a 47 year old nurse
who had recently lost 50 lbs through diet and exercise, the remaining women only
mentioned physical activity as an afterthought or after being prompted by the researcher.
Most study participants stated that they walked around their neighborhoods occasionally
or tried to incorporate exercise in their daily lives by parking further away or taking the
stairs at their place of employment. They sheepishly admitted that they knew that they
should engage in more physical activity, but they were less inclined to devote time to
regularly engage in recreational physical activity. Most study participants emphasized the
importance of managing type 2 diabetes by modifying their consumption of traditional
Caribbean foods over increasing physical activity.

Study participants shared the belief that modifying traditional Caribbean diet
through preparation with less fat and/or reducing portion sizes would help them manage
type 2 diabetes effectively. This cultural belief about how to effectively manage their
type 2 diabetes influenced the decisions that they make about their food choices and
preparation on a daily basis. This cultural belief about modifying of traditional Caribbean
diet is an integral part of the Afro-Caribbean women’s belief model about type 2 diabetes
management.

Prayer and Faith

Prayer and faith was another theme that emerged as an important aspect of study
participants’ management of type 2 diabetes. The responses to the cultural consensus
analysis questionnaires conducted with 30 of the women diagnosed with type 2 diabetes
found that 27 (90 percent) women believed that prayer could help control the disease.
Overall, 34 (85 percent) study participants diagnosed with type 2 diabetes, women stated that they believed that prayer could help them control the disease.

Table 18 shows that the Fisher exact test found no statistically significant relationships between the cultural belief that prayer and faith was an effective treatment of type 2 diabetes and the socio-demographics variables: age, years of type 2 diabetes duration, education attainment, income, country of origin, medical training, transnational migration, and length of time in the U.S.

Table 19. Fisher Exact Test Results of Afro-Caribbean Women Beliefs about Prayer and Faith

<table>
<thead>
<tr>
<th>Variables</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
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<td>Age</td>
<td>0.5248</td>
</tr>
<tr>
<td>Years of Type 2 Diabetes Duration</td>
<td>0.7989</td>
</tr>
<tr>
<td>Education Attainment</td>
<td>0.5569</td>
</tr>
<tr>
<td>Income</td>
<td>0.6726</td>
</tr>
<tr>
<td>Country of Origin</td>
<td>0.0654</td>
</tr>
<tr>
<td>Medical Training</td>
<td>0.6969</td>
</tr>
<tr>
<td>Transnational migration</td>
<td>0.2725</td>
</tr>
<tr>
<td>Length of Time in the U.S.</td>
<td>0.3525</td>
</tr>
</tbody>
</table>

Study participants’ Christian belief also played into their lifestyle choice. When asked if they smoked or drank alcohol, women responded indignantly that they were “Christians” or “church people do not do that.” All the women who espoused prayer as an effective means of controlling type 2 diabetes, dealing with the emotional burden and
frustration of the disease professed to be devoted Christians. A 47 year old nurse who was shocked and scared by her type 2 diabetes diagnosis stated:

I just prayed and I just, just thought about that and said, Lord you know, I said, God you know everything in me and it makes no sense to hide it from you because I’m just hiding from myself.

A 62 year old behavioral coach stated:

I pray in general, not specifically about [diabetes], but I believe that based on what the physician was telling me when I diagnosed first where my levels that people do not normally walk around with levels that high. I attributed that to God looking out for me because I have been a praying woman just about all my life and I believe when you walk with God and you trust him that he takes care of things for you. And I believe that he has done that for me over the years of my life and so many areas of my life. I don’t worry about it. I think that this is God’s business.

A 74 year old retired teacher reflected:

Pray should be number one in everything in your lifestyle. We have to depend on God to take us through this life, not ourselves. We ask him and trust him and we believe. Have to pray and believe that the God will grant whatever you ask him for. You have to be persistent in prayer.

A 64 year old retired nurse stated:

You have to accept the hand that God dealt you. And when you bring yourself to accept it, sooner you get there, the better for you. When you believe in God, you talk to him and say the Serenity prayer. God help me accept the things that I cannot change.

A 47 year old nurse stated, “Oh yes, prayer is a very big part of my life.” A 70 year old nurse stated, “I ask the Lord seeing that I have it [diabetes], to help me to deal with it. It is his will.” A 65 year old retired house keeper stated, “Oh yes, you have to pray that is number one.” These women believe that prayer and faith means putting their lives and
health into “God’s hands.” They received enormous emotional comfort from their Christian faith.

Study participants stressed that prayer was a complementary treatment to control type 2 diabetes. They recounted variations of the popular Caribbean axiom, “God helps those who help themselves.” A 56 year old minister who is legally blind and has just published her first novel stated:

Prayer, my faith, and God are helping me to cope to snatch victory from the jaws of the defeat. Because it is a choice that you make and I have chosen to trust God to see me through my disability. And I still feel that I can do all things through Christ who gives me the strength. … I pray about everything. And God answers prayer. But prayer, faith without works is dead. Prayer is not a magic thing. There is stuff that we have to do. I could pray until never-rary, unless I do what I am supposed to do, it wouldn’t help. Like for instance, I cannot be praying for God to heal me from my diabetes and then I am just eating that is wrong. That is ludicrous. You have got to work with God and he will work with you. That is how prayers are answered.

A 66 year old retired nurse concurred, “I suppose it gives you a well being. You pray, but you also have to take action.” One 46 year old domestic worker who decided to stop her medication and now uses only traditional/alternative remedies to manage type 2 diabetes stated, “what you are doing, you are doing it with prayer.”

Seventeen (42.5 percent) study participants viewed prayer as a way to heal type 2 diabetes and its complications. A 67 year old retired civil servant who is now legally blind believed that her vision would be restored confidently stated:

It isn’t easy, but with God’s all things are possible. Nothing is too hard for him to do. I put my trust in God. This [her blindness] is just a temporary situation, in the name of Jesus. If he does have me here so before I die, I must see. [laughter] You just have to keep your faith.
One 38 year old independent health agent was convinced that type 2 diabetes was curable with a combination of prayer, traditional/alternative remedies, diet and exercising. Her mother was pre-diabetic and had changed her lifestyle delaying the onset diabetes. When told by her physician that type 2 diabetes could not be cured, the 36 year old independent health agent who had recently re-started taking her medication and reading religious books stated that in her mind, she responded, “you are tell me that my God cannot get rid of this? Okay, this [diabetes] is going to be gone. I will be coming back here and telling you that I am diabetic free.” She confidently stated to the researcher, “[prayer] will take away the diabetes.” A 50 year old self-employed business woman stated:

When they told me that I had diabetes, they said that it was irreversible and with my faith, I believe that it can be reversed. I trust God that he is going to heal it, but I know that I have to do a lot with my diet. I love cake and then I’ll take the medicine. It is like you sin and prayer later. I don’t know if the damage is worse.

Table 20 provides the number and percentage of study participants who view prayer as an important component of their type 2 diabetes management.

<table>
<thead>
<tr>
<th>Beliefs about 40 Study Participants’ Prayer and Faith</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helps to cope emotionally with type 2 diabetes</td>
<td>34</td>
<td>85</td>
</tr>
<tr>
<td>Must eat right and exercise for it to be effective</td>
<td>34</td>
<td>85</td>
</tr>
<tr>
<td>Can cure and heal type 2 diabetes</td>
<td>17</td>
<td>42.5</td>
</tr>
<tr>
<td>Church people do not smoke or drink alcohol</td>
<td>37</td>
<td>92.5</td>
</tr>
</tbody>
</table>
Only 6 study participants expressed a conflicted, pragmatic and sometimes humorous attitude about whether or not prayer was an effective means of treating type 2 diabetes. A 59 year old retired nursing assistant when asked about prayer as a treatment stated:

Yes, but I pray and I ask the Lord, but if he is working, he is working slowly. [laughter] “I’m not flying in his face. You have to pray and have faith. If you believe… I don’t know, I don’t know.”

One 67 year old retired domestic worker stated, “praying can help you with a lot of things. Some people get healed and others don’t get heal. You can pray, but that doesn’t mean that it will cure you.” A 53 year old nurse stated, “God helps those who helps themselves. You can’t pray and hope the diabetes will go away.” Overall, the study participants had a strong belief that prayer and faith were helpful and in some cases, an integral part of how they successfully met the challenges of managing type 2 diabetes and its complications in their everyday lives.

The prayer and faith theme reflects the cultural belief that praying is an effective means to control type 2 diabetes and coping with the disease’s management and complications. Prayer and faith in God give most of study participants in this study the emotional and spiritual strength to cope with managing type 2 diabetes. They consider prayer and faith to be a necessary complement to biomedical and traditional/alternative remedies to manage type 2 diabetes and its complications. Even women who expressed frustration with the disease, fall back on their belief in God as hope that their situation will improve or become more tolerable in time. This cultural belief about the
effectiveness of prayer and faith is an integral part of the study participants’ belief model about type 2 diabetes management.

**Research Question 3**

**How do structural barriers to health care created by socioeconomic status influence how study participants manage type 2 diabetes?**

The semi-structured interviews and the responses to the socio-demographic/medical/behavioral questionnaire of 40 study participants were analyzed to identify the structural barriers created by socioeconomic status that influenced the decisions that study participants make about managing type 2 diabetes. Inadequate health insurance coverage is the main structural barrier that affects Afro-Caribbean women’s lives through the cost of medicines and physician visits, the costs of testing strips required to use the glucometer for self-monitoring of glucose levels, and transnational migration. These barriers impact Afro-Caribbean women’s access to primary health care leading them to make decisions that sometimes compromise their management of type 2 diabetes. Table 21 shows the numbers and percentages of study participants who impacted by each structural barrier.

**Table 21. Overview of 40 Study Participants’ Structural Barriers**

<table>
<thead>
<tr>
<th>Structural Barrier</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>High cost of medicines and physician visits</td>
<td>30</td>
<td>75</td>
</tr>
<tr>
<td>High cost of glucometer strips</td>
<td>34</td>
<td>85</td>
</tr>
<tr>
<td>Transnational migration</td>
<td>17</td>
<td>42.5</td>
</tr>
</tbody>
</table>
Inadequate Health Insurance Coverage

As noted previously, 21 (52.5 percent) of study participants diagnosed with type 2 diabetes had health insurance that partially paid for their medications and physician visits, while 19 (47.5 percent) women did not have health insurance. Of the 21 study participants with health insurance coverage, four (19 percent) women had Medicare, three (14 percent) women had Medicaid, three (14 percent) women had Etna, three (14 percent) women had Blue Cross/Blue Shield, two (9.5 percent) women had United Health and the remaining six (28.6 percent) women did not know their health insurance carrier. Ten (52.6 percent) of the women without health insurance were a subset of the 13 women who participate in transnational migration and they will be discussed in more detail in a following section.

The lack of health care resulted in study participants receiving irregular type 2 diabetes care. In one instance, a 38 year old independent health agent who had lost her insurance after quitting her job as a teacher attempted to self-monitor her type 2 diabetes. When she responded to the researcher’s business card recruiting women for this study, she was extremely worried about being prescribed insulin because she suspected her glucose levels were out of control. She had visited a walk-in clinic where she had an appointment with a doctor for $40 and she was given a new prescription for her type 2 diabetes medicine. However, she ran out of prescribed medicine and the traditional/alternative remedies that she was using failed to keep glucose levels under control; as a result her health began to deteriorate. She reported that she felt light headed,
lethargic and experienced sharp pains in her feet which led her to start working at home.

Three months later when she contacted the researcher again and explained her situation:

[No health insurance] that was part of the reason why my sugar was out of control for a while. Because I just didn’t have money to go to a doctor and consult with a doctor and try figure out exactly how to keep my sugar down. I was trying to do things on my own.

Two months prior to the interview, she had an appointment with a private physician who was former client through her job. The physician charged her $150.00 for the visit and gave her a prescription for Glipizide and Metformin to be taken twice a day. She purchased these medicines for $4.00 every month through Wal-Mart’s generic drug program. When asked when next she would visit the physician, she replied:

Since my sugar is under control and now I know what I am doing now, I don’t foresee having to go to the doctor anytime soon. But I do know that you are supposed to go every three months. I’m not going to go unless I get some money down the line. I probably won’t be able to go next month.

Even study participants who had health insurance struggled to meet the deductible and found paying the required co-pay for laboratory blood tests difficult. Sometimes the women were uncertain about the extent of their health insurance coverage. A 65 year old retired business owner who pays $96 per month for Humana Medicare stated:

I was on Liberty and they always send my supplies for my strips and all that. And now actually, they send me a bill for $400. When I call them, they say that my insurance pay and leave that amount. I haven’t paid them yet, but they say that I have to pay that. That is where I usually get my supply and I never pay and suddenly I get the letter so I called them to find out why, and they say that my insurance didn’t cover everything so I have to make an appointment with Medicare and find out why they didn’t pay.
Inadequate health insurance coverage is the primary structural barrier to study participants accessing type 2 diabetes care. Women with no or limited health insurance did not have regular access to prescription medicine and were unable to pay for physician visits or the glucometer strips needed to self-monitor their glucose levels. These women often only sought medical care when their health began to decline and they felt their glucose levels were out of control. They were dependent on family and friends to assist them financially in order to obtain type 2 diabetes and general health care. Inadequate health insurance coverage is a barrier that prevents study participants from accessing not only medical care, but also affects their ability to self-monitor type 2 diabetes effectively.

Cost of Medicines and Physician Visits

The cost of medicines and physician visits also plays a major role influencing how study participants managed type 2 diabetes. Even some women who had health insurance struggled to pay for their medicines and were unable to keep their 3 month physician visits. These women stated that depending on their health insurance deductible their co-pay for physician visits varied from $15 to $25. Nine (47.4 percent) women without health insurance paid cash for their medications and physician visits. Women purchased their medications through $4 per month pharmaceutical generic programs offered by Walgreens, Kmart, and Wal-Mart or directly from their physicians. The costs of medicines were particularly difficult for women who were taking prescription drugs for multiple medical conditions which included antihypertensive agents for hypertension.
Study participants used their social networks to help them meet the costs of medicines and physician visits.

A 46 year old unemployed woman on insulin who was recently diagnosed as schizophrenic and does not have health insurance stated, “I pay for the insulin out of pocket. My physician gives it to me when I come here.” She purchases the prescribed Metformin through Wal-Mart’s $4.00 a month generic pharmaceutical program. She pays $50 for each physician visit and usually sees the physician once a month or when the insulin is about to run out. She also pays cash for the medication to treat schizophrenia. In a conversation with the researcher, the Jamaican primary care physician who treated both this woman and her spouse (also a diabetic) stated that he charged his Caribbean patients a nominal visitation fee and that he often gave them samples of medicines and insulin to reduce their costs of treating type 2 diabetes.

A 47 year old nurse was taking approximately 10 prescribed medications to treat type 2 diabetes, high cholesterol and hypertension to lower the risk of reoccurrence of a stroke she had in the 1990s. Even though she had good health insurance coverage, the costs of the all these medications were difficult so she often used her networks to obtain samples of medicines from hospital to reduce their costs. She stated:

I pay a co-pay through the hospital pharmacy or sometimes I go to the diabetes clinic and say give me some pills or strips and they will give them to me.

The costs of medicines and physician visits are related to inadequate health insurance coverage. These women do not have the income that allows them to pay for the health insurance coverage or costs of medicines and physicians visits. Women relied on
family and friends as well as their social networks to help them meet these costs. The costs of medicines and physician visits are a barrier that prevents study participants from effectively using the biomedical treatment to treat type 2 diabetes.

*Cost of Glucometer Testing Strips*

The cost of the testing strips required by the glucometers used to test the blood glucose levels prevented study participants from managing type 2 diabetes effectively. With the exception of two women, all the women interviewed had a glucometer machine that they had received from their physician for free or had purchased under their health insurance. Although study participants stated that they did not test themselves daily because they disliked sticking their fingers, they readily confessed that their decision to test themselves sporadically was mainly because the cost of the glucometer strips was prohibitive. They would only test their glucose levels when they were feeling physically unwell. Study participants with health insurance reported that even with a co-pay the glucometer strips were expensive to purchase. A check of pharmacies in the Tampa Bay region and found that 100 glucometer strips cost approximately $100 without health insurance. When asked why she does not test her glucose levels every day, a 77 year old retired nurse who lives in Trinidad for six months out of the year replied:

> You know the cost of those strips? I’m a pensioner. I have to purchase them from the drug store [in Trinidad]. For 50, it is about $275 to $285. Dollar for dollar, they are more dare in America. Friends used to bring strips for me and when I check it out, I said don’t bother, give me the money I’ll buy it in Trinidad. I’ll get more out of it.
The exchange rate is one Trinidadian dollar for six U.S. dollars so she is paying approximately $45 U.S. for the 50 strips which is the average cost of these strips in a pharmacy in the U.S.

Study participants found it difficult to replenish the strips before and after they ran out. A 46 year old unemployed woman on insulin without health insurance who usually tests herself every day stated, “I’m out of my test strips now, I have to go get some. I’m out about a month now.” When asked why she hadn’t bought more sooner she stated:

Financial reasons because they are expensive. I have to wait until my husband gets paid because he is the only one who is providing for the bills. I have to wait until all the bills get paid to see what we can do.

Study participants have developed strategies to circumvent the high costs of the glucometer strips. A 64 year old daycare owner with health insurance who lives in the U.S. reported:

There is a price that that they [health insurance company] quote you for the co-pay that is higher if I get it on my own. My daughter gets it online. She has an account and she gets a 100 for maybe $30 something which is a lot cheaper than buying it from the drugstore.

Her daughter, a 36 year old facilities representative for Starbucks, also diagnosed with type 2 diabetes and who was interviewed in this study stated:

When I get the strips through my insurance they are expensive, $30 or $40 for a 50 box so what I actually do is, I go on Ebay and I buy my strips that way. I can get 150 for the same $30 on Ebay for me and my mom. I have been doing it for a year and half now and I haven’t had any problems. They do put the expiration date on there.
Other study participants engaging in transnational migration received financial help from family members to purchase the glucometer strips. A 71 year old retired machine operator stated:

My daughter’s husband, he bought me the little meter so I tell him whenever I need strips. So when they are running out, I’ll always tell him. So when they are coming down to Trinidad, they bring a certain amount. Since I’m using the meter that is how it works.

A 71 year old retired nurse stated:

I buy them myself when I am in Florida. My niece buys me the strips and mails them to me when I’m at home. She lives in America. They are very expensive here in Trinidad.

The cost of the glucometer testing strips frequently prevented study participants from self-monitoring type 2 diabetes effectively. The glucometers were free and easily obtained through physicians and even family members. However, even with health insurance, women reported that the strips were expensive to purchase in the U.S. and in their country of origin. Women rationed the strips by testing their glucose levels sporadically. Although women tried to always have testing strips, they were often unable to purchase more when they ran out. They relied on the support of family and friends to purchase the strips. The cost of the glucometer testing strips is a barrier that prevents study participants from self-monitoring their glucose levels as recommended by the ADA.
Transnational Migration

Engaging in transnational migration has prevented study participants from effectively managing type 2 diabetes. Thirteen (32.5 percent) women engaged in transnational migration, living with family and friends the U.S. for four to six months every year. Although the women admit that they provide child care for their families, they were only willing to hint that they worked illegally and were being paid “under the table.” Anecdotal evidence suggests that the retired nurses are hired by private agencies to provide home care to elderly clients through Medicare.

Study participants had access to regular type 2 diabetes care in their countries of origin. Only one of these women had health insurance that contributed to the costs of her type 2 diabetes medicines through her husband’s union in her country of origin. However, 11 study participants were Trinidadian and received free prescription medications through the Chronic Disease Assistance Plan (CDAP). Bobb and colleagues (2008) found that around 62 percent of individuals diagnosed with type 2 diabetes receiving prescribed hypoglycemic agents form CDAP were able to successfully control their glucose levels. One woman in this study was taking prescribed insulin, but had not applied to receive a free glucometer and strips from CDAP. The one remaining woman, a 66 year old Jamaican nurse received prescribed medications through Jamaica Drugs for the Elderly Program, government discount program for individuals over 55 years old (Mullings and Paul 2007).
All 13 study participants were eligible to receive free health care from government health clinics and hospitals in their home countries. However, due to the protracted wait to see the physician and/or nurses as well as the occasional no-show of physicians, these women felt that they would receive better and more regular health care by paying higher fees to be treated by private physicians in their home countries. A 59 year old retired nursing assistant stated, “I have to pay for the doctor visit. The clinic is free, but it is just the length of time that you have to wait, sometimes you go and the doctor does not come.” A 66 year old nurse stated that the cost of seeing a private physician was prohibitive so she chose to receive her type 2 diabetes care from the local government health clinic. About private physicians, she stated, “it becomes a little costly and they tend to put you on the top notch medicines so it becomes very expensive.”

Study participants were reluctant to discuss how they accessed health care when these women lived in the U.S. However, it is clear that their health care became more erratic and less stable away from their country of origin. Two women stated that they took a 6 month supply of type 2 diabetes medication when they visited the U.S., the rest of the women were deliberately vague when asked about how they paid for their medications and physician visits when they were in the U.S. However, they mentioned that they did not have their regular 3 to 4 month type 2 diabetes medical visit when they were in the U.S. Yet these women developed strategies through their communal networks to obtain type 2 diabetes care and health care in general. A 71 year old retired nurse confessed that once she ran out of medicine so her niece arranged for her to visit a
physician who gave her samples of type 2 diabetes medicines as a stop gap until she returned to her country of origin. A 71 year old retired machine operator who was having severe back pain stated that her daughter arranged for her to see a physician who diagnosed a cyst in her back. Hospital emergency rooms also served as a source of treatment for these women when they become seriously ill.

Transnational migration is a structural barrier to study participants accessing regular type 2 diabetes care. Women engaging in transnational migration are able to access type 2 diabetes care and medications for free in their country of origin through the national health care system though some women elect to pay for private health care. Women from Trinidad are able to receive type 2 diabetes medicines for free CDAP and women from Jamaican can purchase discounted medicines through other government programs. However, when these women bring prescription medicines to the U.S., but when living in the U.S., their type 2 diabetes care becomes unreliable. Although these women have developed strategies through a network of friends and family to access health care usually in emergency situations, they are not able to have their regular type 2 diabetes visit with a health care professional. Transnational migration is a barrier that prevents study participants from accessing regular type 2 diabetes care.
Research Question 4

Are type 2 diabetes risk factors, overweight and obesity present in this study population?

Anthropometric Findings

To determine the proportion of overweight and obesity in this study population, BMI was calculated from the self-reported height and weight data. Of the 40 study participants, 33 (82.5 percent) women self-reported their height and weight. The mean self-reported height was 1.63 meters with a minimum of 1.47 and maximum of 1.80. The mean self-reported weight was 114.76 kilograms with a minimum of 52.16 kilograms and maximum of 77.31 kilograms. The mean BMI was 28.95 with a minimum of 21.03 and maximum of 40.83. The mean and standard deviation of study participants’ self-reported height and weight and BMI are displayed in Table 22.

Table 22. Self-Reported Weight/Height of 33 Study Participants

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (m)</td>
<td>1.6336</td>
<td>.067038</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>77.318</td>
<td>15.9705</td>
</tr>
<tr>
<td>BMI (weight/height²)</td>
<td>28.954</td>
<td>5.57</td>
</tr>
</tbody>
</table>

Of the 33 study participants who self-reported their height and weight, 39.39 percent (13) women were obese, 30.3 percent (10) women were overweight, and 30.3
percent (10) women were normal weight. The crude obesity prevalence in the study population was 39.39 percent. Using the 2000 U.S. population as the standard, the age-adjusted prevalence of obesity was 40.39 percent.

Table 23 presents the BMI (kg/m²) categories of study participants. As mentioned previously, to reduce misclassification due to overestimation of self-reported height and underestimation of self-reported weight, the BMI categorization was lowered to 29.2 (Daughinot et al. 2008).

<table>
<thead>
<tr>
<th>BMI Category</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight (&lt;18.5)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Normal Weight (18.5–24.9)</td>
<td>10</td>
<td>30.3</td>
</tr>
<tr>
<td>Overweight (25.0–29.2)</td>
<td>10</td>
<td>30.3</td>
</tr>
<tr>
<td>Obesity (≥29.3)</td>
<td>13</td>
<td>39.39</td>
</tr>
</tbody>
</table>

There were high proportions of hypertension among obese and overweight study participants. Of the 13 obese study participants, eight (61.54 percent) women were also diagnosed with hypertension. Of the 10 overweight study participants, six (60 percent) women were diagnosed with hypertension. Of the 10 normal weight study participants, seven (70 percent) women were diagnosed with hypertension. These data are displayed in Table 24. In adults 18 years and older having blood pressure with diastolic ≥ 90 mm Hg and/or a systolic ≥ 140 mm Hg is classified as hypertension. The Fisher exact test found no statistically significant relationship between BMI and hypertension, (p = .1).
Table 24. Hypertension and BMI in 33 Study Participants

<table>
<thead>
<tr>
<th>Hypertension</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Weight (Total = 10)</td>
<td>7</td>
<td>70</td>
</tr>
<tr>
<td>Overweight (Total = 10)</td>
<td>6</td>
<td>60</td>
</tr>
<tr>
<td>Obesity (Total = 13)</td>
<td>8</td>
<td>61.54</td>
</tr>
</tbody>
</table>

The BMI scores of the 33 study participants were correlated with the socio-demographic variables; age, age at type 2 diabetes diagnosis, years of type 2 diabetes duration, years of education, and length of time living in the U.S. The Spearman correlation analysis found there was a significantly negative correlation between study participants’ BMI and age at type 2 diabetes diagnosis ($r_s = -0.42993$, $p = .0125$). Study participants with higher BMI were younger at age of type 2 diabetes diagnosis than women with lower BMI. Study participants with lower BMI had been diagnosed with type 2 diabetes for a shorter period of time than study participants with higher BMI. The Spearman correlation analysis found no significant relationship between BMI scores and age, years of type 2 diabetes duration, cultural knowledge scores, years of education, and length of time in the U.S.

Of the 30 study participants who responded to the cultural consensus questionnaire, 24 study participants provided the self-reported height and weight data. BMI of these 24 study participants was correlated with their individual cultural knowledge scores and there was no significant relationship. Table 25 displays the results of the Spearman correlation analysis.
Table 25. Spearman Correlation Results of 33 Study Participants’ BMI

<table>
<thead>
<tr>
<th>Variables</th>
<th>$r_s$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-0.28128</td>
<td>.1128</td>
</tr>
<tr>
<td>Age at Type 2 Diabetes Diagnosis</td>
<td>-0.42993</td>
<td>.0125</td>
</tr>
<tr>
<td>Cultural Knowledge Scores</td>
<td>-0.21217</td>
<td>.3196</td>
</tr>
<tr>
<td>Years of Type 2 Diabetes Duration</td>
<td>.06937</td>
<td>.7013</td>
</tr>
<tr>
<td>Years of Education</td>
<td>-0.13729</td>
<td>.4461</td>
</tr>
<tr>
<td>Length of Time in the U.S.</td>
<td>-.03380</td>
<td>.8518</td>
</tr>
</tbody>
</table>

The relationship between BMI and these socio-demographic variables was further examined using scatter plots. Figure 9 shows the significant relationship that study participants who were younger at age of type 2 diabetes diagnosis had higher BMIs than their counterparts who were older at age of diagnosis. Women who were younger at the age of type 2 diabetes diagnosis were unable to control their BMI. Possible explanations for the higher BMIs in study participants were younger at the age of type 2 diabetes diagnosis are acculturation as well as aging. These possible explanations are reviewed in the Discussion section.
Figure 9. Study Participant’s Age of Type 2 Diabetes Diagnosis and BMI
Figure 10 shows the relationship between study participant’s age and BMI. The scatter plot suggests that there is no discernable relationship between study participants’ age and BMI.

Figure 10. Study Participants’ Age and BMI
Figure 11 shows the relationship between study participants’ BMI and individual cultural knowledge scores. The scatter plot suggests that there is no discernable relationship between study participants’ BMI and individual cultural knowledge scores.
Figure 12 shows the relationship between study participants’ BMI and years of type 2 diabetes duration. The scatter plot suggests that there is no discernable relationship between study participants’ BMI and years of type 2 diabetes duration.
Figure 13 shows the relationship between study participants’ BMI and years living in the U.S. The scatter plot suggests that there is no discernable relationship between study participants’ BMI and years living in the U.S.

Figure 13. BMI and Years Living in the U.S.
Figure 14 shows the relationship between study participants’ BMI and years of education. The scatter plot suggests that there is no discernable relationship between these two variables.

Figure 14. BMI and Years of Education
An analysis of the variables, age and age at type 2 diagnosis with the BMI categories is shown in Table 26. Table 26 indicates that study participants who were normal weight were approximately 10 years older than their counterparts who were overweight, obese, and overweight and obese. The mean age of study participants who were normal weight was 69.5 years. The mean age of overweight and obese study participants were 59.6 years and 60.8 years, respectively. The overweight and obese study participants were combined into one group and their mean age was 60.3 years. The mean age of all study participants was 62.62 (Std. Dev. 12.25) which was similar to the mean age and std. dev. of the study participants with higher BMIs.

Table 26 also shows that study participants who were overweight, obese, and overweight and obese were younger at age of type 2 diagnosis than their older counterparts who were normal weight. The mean age of overweight study participants at type 2 diagnosis was 52.8 years. The mean age of obese study participants at type 2 diagnosis was 46 years. Overweight and obese study participants were combined into one group and their mean age at type 2 diagnosis was 49 years. The mean age of normal weight study participants at type 2 diagnosis was 58.3 years.
Table 26. BMI of 33 Study Participants by Mean Age

<table>
<thead>
<tr>
<th>BMI</th>
<th>Mean Age</th>
<th>Std. Dev.</th>
<th>Mean Age at Diagnosis</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Weight</td>
<td>69.5</td>
<td>11.49</td>
<td>58.3</td>
<td>13.4</td>
</tr>
<tr>
<td>Overweight</td>
<td>59.6</td>
<td>13.15</td>
<td>52.8</td>
<td>11.6</td>
</tr>
<tr>
<td>Obesity</td>
<td>60.8</td>
<td>11.25</td>
<td>46</td>
<td>10.43</td>
</tr>
<tr>
<td>Overweight and Obesity</td>
<td>60.3</td>
<td>11.84</td>
<td>49</td>
<td>11.23</td>
</tr>
</tbody>
</table>

The Mann-Whitney $U$ test was used to determine if there was a significance difference in study participants’ mean age and age at type 2 diabetes diagnosis by BMI category. The Mann-Whitney $U$ test was the appropriate test because of the small sample sizes and the use of self-reported height and weight data (Madrigal 2008).

The Mann-Whitney $U$ test found that there was no significant difference between study participants’ mean age by BMI category. The results of the Mann-Whitney $U$ test are also presented in Table 27. Normal weight and overweight study participants’ mean age were not significantly different ($z = 1.51, p = 0.131$). No significant difference was found between normal weight and obese study participants’ mean age ($z = 1.09, p = 0.2757$). There was also no significant difference between normal weight study participants and the combined category of overweight and obese study participants’ mean age ($z = 1.49, p = 0.1362$). Overweight and obese study participants’ mean age were not significantly different ($z = -0.06, p = 0.9522$). The Mann-Whitney $U$ test also found that there was no significant difference between overweight study participants and the combined category of overweight and obese study participants’ mean age ($z = -0.04, p = 0.9626$).
Lastly, no significant difference was found between obese study participants and the combined category of overweight and obese study participants’ mean age ($z = 0.488$, $p = 0.9761$).

Additionally, the Mann-Whitney U test found that there no significant difference between study participants’ mean age at type 2 diabetes diagnosis by BMI category. These results of the Mann Whitney U test are also displayed in Table 27. No significant difference was found between normal weight and overweight study participants’ mean age at type 2 diabetes diagnosis ($z = 1.02$, $p = 0.3077$). Normal weight and obese study participants’ mean age at type 2 diabetes diagnosis were not significantly different ($z = -0.56$, $p = 0.5755$). There was no significant difference between normal weight study participants and the combined category of overweight and obese study participants’ mean age at type 2 diabetes diagnosis ($z = 1.78$, $p = 0.0751$). Overweight and obese study participants’ mean age at type 2 diabetes diagnosis was not significantly different ($z = -1.64$, $p = 0.101$). There was no significant difference between overweight study participants and the combined category of overweight and obese study participants’ mean age at type 2 diabetes diagnosis ($z = 1.06$, $p = 0.2891$). Lastly, the Mann-Whitney U test found that there was no significant difference between obese study participants and the combined category of overweight and obese study participants’ mean age at type 2 diabetes diagnosis ($z = 0.89$, $p = 0.3735$).
Table 27. Mann-Whitney U Test Results of 33 Study Participants by BMI

<table>
<thead>
<tr>
<th>BMI</th>
<th>z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal Weight &amp; Overweight</td>
<td>1.51</td>
<td>0.131</td>
</tr>
<tr>
<td>Normal Weight &amp; Obesity</td>
<td>1.09</td>
<td>0.2757</td>
</tr>
<tr>
<td>Normal Weight &amp; Overweight/Obesity</td>
<td>1.49</td>
<td>0.1362</td>
</tr>
<tr>
<td>Overweight &amp; Obesity</td>
<td>-0.06</td>
<td>0.9522</td>
</tr>
<tr>
<td>Overweight &amp; Overweight/Obesity</td>
<td>-0.04</td>
<td>0.9681</td>
</tr>
<tr>
<td>Obesity &amp; Overweight/Obesity</td>
<td>0.488</td>
<td>0.9761</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mean Age at Type 2 Diabetes Diagnosis</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Weight &amp; Overweight</td>
<td>1.02</td>
<td>0.3077</td>
</tr>
<tr>
<td>Normal Weight &amp; Obesity</td>
<td>-0.56</td>
<td>0.5755</td>
</tr>
<tr>
<td>Normal Weight &amp; Overweight/Obesity</td>
<td>1.78</td>
<td>0.0751</td>
</tr>
<tr>
<td>Overweight &amp; Obesity</td>
<td>-1.64</td>
<td>0.101</td>
</tr>
<tr>
<td>Overweight &amp; Overweight/Obesity</td>
<td>1.06</td>
<td>0.2891</td>
</tr>
<tr>
<td>Obesity &amp; Overweight/Obesity</td>
<td>-0.89</td>
<td>0.3735</td>
</tr>
</tbody>
</table>

The findings of the Mann-Whitney U test indicated that although normal weight study participants were approximately 10 years older than their counterparts who had higher BMIs, this was not statistically significant. The Mann-Whitney U test also found no significant difference in study participants’ mean age or mean age at type 2 diabetes diagnosis by BMI category. Study participants’ mean age and mean age at type 2 diabetes diagnosis do not significantly differ by BMI category.

Since obesity is associated with increased risk for type 2 diabetes, the Chi square test was performed to determine if there was a significant relationship between study participants’ obesity and the socio-demographic variables. The BMI groups; normal weight and overweight were collapsed to create a non-obese group. The assumption of the Chi square test was violated in all analyses with the exception of the
analysis of obese/non-obese with the use of traditional/alternative remedies. The Chi square test found that there was no statistically significant relationship between obese and non-obese study participants that their cultural belief that traditional/alternative remedies are an effective means of controlling type 2 diabetes, \( p = .5154 \).

Since the assumptions of the Chi square test were violated because the expected frequencies in at least one cell was >5, the Fisher exact test was used to determine if there was a significant relationship between obesity and the collapsed BMI categories, normal weight and overweight, with the socio-demographic variables: age at type 2 diabetes diagnosis, years of type 2 diabetes duration, education attainment, income, and length of time in the U.S. The Fisher exact test found no significant relationships between obese/non-obese study participants and the socio-demographic variables: age, age at type 2 diabetes diagnosis, years of type 2 diabetes duration, education attainment, income, and length of time in the U.S. The Fisher exact test found that there was no statistically significant relationship between the obese/non-obese study participants and their cultural beliefs that prayer and faith, traditional/alternative remedies and a modified traditional Caribbean diet are effective means of controlling type 2 diabetes. The Fisher exact test also found that there was no statistically significant relationship between obese/non-obese study participants and the structural barriers of health insurance coverage and transnational migration. Table 28 shows that the results of Fisher exact test.
Table 28. Fisher Exact Test Results: BMI and Belief Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Socio-demographic</strong></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>.5536</td>
</tr>
<tr>
<td>Age at Type 2 Diabetes Diagnosis</td>
<td>.7811</td>
</tr>
<tr>
<td>Years of Type 2 Diabetes Duration</td>
<td>.9671</td>
</tr>
<tr>
<td>Education Attainment</td>
<td>1</td>
</tr>
<tr>
<td>Income</td>
<td>.6222</td>
</tr>
<tr>
<td>Length of Time in the U.S.</td>
<td>.2635</td>
</tr>
<tr>
<td><strong>Cultural Belief Themes</strong></td>
<td></td>
</tr>
<tr>
<td>Modify traditional Caribbean Diet</td>
<td>.1057</td>
</tr>
<tr>
<td>Prayer and Faith</td>
<td>.2654</td>
</tr>
<tr>
<td><strong>Structural Barriers</strong></td>
<td></td>
</tr>
<tr>
<td>Health Insurance Coverage</td>
<td>.2717</td>
</tr>
<tr>
<td>Transnational migration</td>
<td>.0758</td>
</tr>
</tbody>
</table>
Chapter V – Discussion

This dissertation research investigates how cultural beliefs about type 2 diabetes and structural barriers to accessing health care influence the decisions that women of African descent from the English-speaking Caribbean, primarily Jamaican and Trinidadian in the U.S. make about managing the disease. While there are no health statistics specifically about type 2 diabetes among English-speaking Afro-Caribbean women in the U.S., this population in the Caribbean and the U.K. are at higher risk for the disease and its complications. The health disparities found among immigrant and minority populations along with the high prevalence of type 2 diabetes in the U.S. strongly suggest that these women are at higher risk for type 2 diabetes and its complications (Williams, Neighbors, Jackson 2003).

This dissertation research using cultural consensus theory, political economic theory of health, and the analysis of self-reported anthropometric data to understand the experiences of primarily Jamaican and Trinidadian women diagnosed with type 2 diabetes. The critical medical anthropology approach to health proposes that human biological conditions must be viewed through the prism of cultural and political economic processes. Proponents of political economy theory of health argue that ill health or biological conditions in a capitalistic society must be studied considering class, labor, and power structures (Goodman and Leatherman 1998). These structures barriers
are imposed by a capitalistic society on members of the lower socioeconomic classes and prevent them from accessing both preventative care and treatment for diseases. These structural barriers are outside of an individual’s control and constrain the decisions that individuals can make about their health.

In the past, biocultural anthropology studies have not emphasized the use of systematic methods to measure culture and cultural beliefs about diseases and other health related concepts. To operationalize the study of culture, recently biocultural anthropologists have used cultural consensus theory developed in the field of cognitive anthropology (Daniulaityte 2004; Dressler 2005). Cultural consensus theory contends that in any given culture, individuals share concepts or beliefs about cultural models even though acting on those beliefs may be constrained by structural barriers (D’Andrade 1995). These cultural models can be related to one or more cultural domains. Cultural consensus theory is also a statistical method that measures the shared cultural beliefs of a population about a cultural domain (Romney, Weller, and Batchelder 1986).

The biocultural anthropology framework also holds that the biological dimensions of disease should be investigated and integrated with the environmental and cultural aspects of disease. In this dissertation research, self-reported anthropometric measurements are used to calculate and categorize BMI in order to examine the presence of overweight and obesity, biological risk factors for metabolic response diseases such as CVD. Next, this discussion will explore how cultural beliefs and structural barriers
influence how study participants manage type 2 diabetes and their ability to control their BMI.

**Cultural Consensus Analysis**

Cultural consensus analysis was used to determine if study participants share cultural beliefs about type 2 diabetes. Once it was determined that these study participants shared a cultural explanatory model of type 2 diabetes, the qualitative data were analyzed to identify how cultural beliefs anchored in cultural meaning and are translated into practices that influenced their decisions about management of the disease. Quantitative and qualitative methods were then used to identify the structural barriers that prevented these women from managing the disease effectively. In this dissertation research, additional meanings to the cultural beliefs of study participants were gathered from semi-structured interviews and comments made responding to the cultural consensus questionnaire. However, the interpretation of these cultural meanings was only examined as they related to how they influenced study participants’ decisions about how to manage type 2 diabetes.

The cultural consensus analysis found that overall study participants highly shared a single cultural belief model about the disease’s prevention, causation, symptoms, complications, and treatment. The cultural consensus analysis performed separately on study participants with medical education/training and study participants **without** medical education/training showed that both groups highly shared a single belief model about type 2 diabetes. Study participants **without** medical education/training had the same level
of agreement with the overall study sample (83 percent), while study participants with medical education/training had a higher level of agreement (87.7 percent) than both those two groups. The higher level of agreement among study participants with medical education/training may be due to these women having greater biomedical knowledge and experience with type 2 diabetes, but it is also likely that the higher level of agreement is a consequence of conducting the cultural consensus analysis with such a small sample size, seven study participants. Similar mean cultural knowledge scores for the three groups, the total study participants, the study participants with and without medical education/training suggest that study participants share the cultural knowledge despite their medical training and education.

Even though the findings suggest that study participants’ cultural beliefs about type 2 diabetes are similar to the biomedical model, the questionnaire was not designed as a medical knowledge test. Medical knowledge tests are checked against the biomedical “correct” type 2 diabetes answers (Fitzgerald 1998). Cultural consensus analysis determines the culturally “correct” answer based on the majority responses to questions. The cultural consensus analysis questionnaire measures the patterns of agreement of study participants’ cultural beliefs about type 2 diabetes so there were some instances where there is divergence from the biomedical model.

While cultural consensus analysis about type 2 diabetes has not previously been conducted on the English-speaking Afro-Caribbean community, the finding of a shared cultural belief model about type 2 diabetes is consistent with studies that have conducted
cultural consensus analysis about type 2 diabetes causation in other ethnic populations (Daniulaityte 2004; Garro 2000; Weller et al. 1999; Ratanasuwan et al. 2005). Daniulaityte (2004) found that a sample population diagnosed with type 2 diabetes at a clinic in Guadalajara, Mexico shared a cultural belief model about the disease. In this study, women had more cultural knowledge about type 2 diabetes than men. Also, individuals with higher cultural knowledge about type 2 diabetes had better glucose control than individuals with lower cultural knowledge. Garro (2000) identified a single cultural belief model among individuals diagnosed with type 2 diabetes living in an Anishinabe, Ojibway community. Weller and colleagues (1999) found a shared explanatory model about type 2 diabetes in each four Latino communities in Hartford, Connecticut, Edinburg, Texas, Guadalajara, Mexico and rural Guatemala and these beliefs were similar across the geographic locations. Ratanasuwan and colleagues (2005) conducted cultural consensus analysis on individuals diabetes from four ethnic groups diagnosed with type 2 in Thailand and found that only one ethnic group had a shared cultural belief model.

This dissertation research found that cultural knowledge of study participants diagnosed with type 2 diabetes includes medical knowledge about the disease, this cultural knowledge is also drawn from a myriad of individual and societal experiences that have a collective meaning. The cultural knowledge reflects the dynamic cultural relationship between Caribbean populations and the U.S. Study participants based their responses about type 2 diabetes on their individual and familial experiences with the
disease in their country of origin and the U.S. Study participants occasionally referred to medical information about type 2 diabetes provided by physicians and health clinics such as pancreas malfunction being the cause of type 2 diabetes. The phrase “that is what they say” was used frequently to obliquely refer to biomedical advice provided to women. Yet there was tinge of skepticism in these responses as a majority of the women seemed fatalistic about the onset of type 2 diabetes when asked about disease prevention. Even women who had a strong belief that type 2 diabetes was hereditary, expressed skepticism that type 2 diabetes’ onset could be prevented by regular exercise, diet and losing weight even when giving the “correct” biomedical response to the cultural consensus questionnaire.

Study participants linked the disease’s onset to biomedical explanations, particularly hereditary, a malfunctioning pancreas, poor diet and the lack of regular exercise. With exception of two women, all the study participants had parents and family members who had been diagnosed with the disease in their country of origin. Study participants had even acted as caretakers for ailing parents who eventually died from the disease’s complications. Because of the numerous biological relatives diagnosed with type 2 diabetes, women did not associate living with the U.S. as the primary reason for the onset of type 2 diabetes. This finding contrasts with the study conducted by Daniulaityte (2004) which found that Mexicans diagnosed with type 2 diabetes perceived the disease as a recent phenomenon. Daniulaityte (2004) found also that emotional
distress and fright were considered one of the major reasons for the onset of type 2 diabetes.

When asked about the disease’s symptoms and complications, study participants drew on their own experiences with the disease as well as those of friends and family members. Study participants spoke about their frustration with coping with the disease’s symptoms such as the lethargy which made it difficult for them to work. They also discussed their fears about the disease causing their health to deteriorate which led to erratic employment and hastened retirement. It was particularly distressing for study participants whose vision had severely declined as a result of retinopathy. One woman who was now legally blind described herself as a “shut-in” dependent on her nephew who gave up his own home to live with her to provide her with in-home care. Her nephew purchased her medications and glucometer testing strips, gave her insulin injections, took her to appointments, and shopped for groceries. Two sisters interviewed separately spoke sorrowfully about their father’s limbs being amputated before he finally died from type 2 diabetes’ complications over 20 years ago. One woman had a brother whose left foot had been amputated and was on dialysis. A month later, she reported to the researcher that her brother had died in New York from type 2 diabetes complications. It is clear that the prevalence of type 2 diabetes has had a profound effect on Caribbean families both in their country of origin and in the U.S.

When it came to type 2 diabetes treatment, study participants were very familiar with the biomedical treatment and guidelines. They agreed that insulin, oral
hyperglycemic agents, regular exercise, a diet low in fat and starches as well as from losing weight were the most effective treatments of type 2 diabetes. Unlike the Latino populations in the Weller and colleagues (1999) study, study participants were aware of insulin as a treatment for type 2 diabetes and were concerned that they would someday have to take insulin if they did not control their glucose levels successfully. Fear of being prescribed insulin to treat type 2 diabetes was also present in the study conducted with Afro-Caribbean study participants diagnosed with type 2 diabetes in the U.K. by Brown, Avis, and Hubbard (2007)

Shared cultural knowledge not directly related to the biomedical model was readily identifiable in the case of study participants who agreed that “when ants follow the urine, a person should suspect they have diabetes.” A majority of these study participants could not specifically recall where they had heard this belief, but said that they had been “told” that it was true. Similarly, women who held the belief that traditional Caribbean medicine, specifically bitter melon/noni/caraili was an effective way to control glucose levels because it was bitter could not recall the source of this knowledge. They talked about their beliefs as things that they had “heard” and that were generally accepted, even intuitively. Study participants have developed a cultural belief model about type 2 diabetes that integrates both the biomedical model and cultural knowledge from their country of origin as well as communities established in their new country of residence. There was no difference about these integrated cultural beliefs by country of origin.
The Spearman correlation analysis was performed to test hypotheses about the association between the socio-demographic variables and study participants’ individual cultural knowledge scores. These scores are the proportion of shared cultural beliefs of each study participant i.e., her individual cultural knowledge about type 2 diabetes. Spearman correlation analysis showed no significant relationship between the individual cultural knowledge scores and age, years of type 2 diabetes duration, years of education, and length of time in the U.S. However, Spearman correlation analysis found that study participants with higher individual cultural knowledge scores were younger at age of type 2 diabetes diagnosis than study participants with lower individual cultural knowledge scores.

The association between study participants with higher individual cultural knowledge scores and younger age of type 2 diabetes diagnosis suggests that study participants who were younger at age of diagnosis had more time to accumulate cultural knowledge about type 2 diabetes. This is confirmed by the study participants’ responses to the interviews and the Cultural Beliefs about Type 2 Diabetes questionnaire. Study participants reported discussing their type 2 diabetes status with medical professionals, friends, and families. Also, study participants’ knowledge about type 2 diabetes was buttressed by their own personal experiences and those of their family members with the disease.

The finding that study participants gained their cultural knowledge from friends and family is consistent with the finding of a study conducted with Afro-Caribbean
participants diagnosed with type 2 diabetes in the U.K which concluded that participant’s type 2 diabetes beliefs were influenced by friends and families as well as childhood memories of the Caribbean (Brown, Avis, and Hubbard 2007). This collective memory combined with individual and family experiences with type 2 diabetes contributes to the decision-making and behaviors that study participants in this dissertation research make about managing the disease.

Cultural Beliefs and Practices about Type 2 Diabetes

The analysis of the semi-structured interviews identified the cultural beliefs about type 2 diabetes that were the major influences on the decisions that study participants made about managing the disease. These cultural beliefs and knowledge are drawn from collective memories within societal frameworks. They reflect individual and societal experiences with type 2 diabetes. Cultural beliefs are cognitive, but anthropologists understand they are acted upon by individuals even though individuals’ decisions may be constrained by political economic structures.

The most influential cultural beliefs that study participants shared about how to effectively manage type 2 diabetes were; the efficaciousness of traditional/alternative remedies, the effectiveness of a modified Caribbean diet and lifestyle, and the importance of prayer and faith. The tensions between study participants’ cultural beliefs about type 2 diabetes and translating their cultural beliefs into practices and behaviors were apparent when study participants managed the disease on a daily basis.
Efficaciousness of Traditional/Alternative Remedies

Twenty three (57.5 percent) of 40 study participants diagnosed with type 2 diabetes believed that using traditional/alternative remedies could effectively control their glucose levels and other medical conditions such as high blood pressure, high cholesterol as well as improve their overall well being. While women used Caribbean medicinal plants that were consumed in liquefied forms to treat type 2 diabetes, they also purchased commercially produced traditional/alternative remedies. These commercially produced traditional/alternative remedies were used sporadically due to their cost and uncertainty about their effectiveness. Although study participants were asked if they used traditional/alternative remedies to treat type 2 diabetes, they were not asked directly if they used alternative or traditional healing methods besides prayer and faith.

The Fisher exact test found that there was no significant association with the belief that traditional/alternative remedies were efficacious treatments for type 2 diabetes and study participants’ age, years of type 2 diabetes duration, education attainment, income, country of origin, medical training, transnational migration, and length of time in the U.S. However, a higher proportion of study participants with medical training did not believe that traditional/alternative remedies were an effective treatment of type 2 diabetes.

The use of traditional Caribbean medicines and remedies were also favored by Afro-Caribbean migrants diagnosed with type 2 diabetes in studies conducted in the U.K. (Scott 1998; Brown, Avis, and Hubbard 2007). Studies conducted in the English-
speaking Caribbean found frequent use of traditional medicines/remedies to treat type 2 diabetes (Delgoda et al. 2004; Lans 2006; Moss and McDowell 2005; Mahabir and Gulliford 1997; Wint et al. 2006). Most of these studies found that alternative Caribbean medicines and remedies were used along with prescribed medicines to control blood glucose levels.

In the Scott (1998) and Brown, Avis, and Hubbard (2007) studies, Afro-Caribbean study participants diagnosed with type 2 diabetes in the U.K. believed that Caribbean medicinal plants that were liquefied, boiled, and drunk were an effective complementary treatment for type 2 diabetes and hypertension and contributed positively to assuring overall good health. Moss and McDowell (2005) conducted a focus group with six women diagnosed with type 2 diabetes at a health center in rural St. Vincent. Moss and McDowell (2005) found that medicinal plants were used by five of the six women to treat type 2 diabetes. Scott (1998) found that Afro-Caribbean participants in the U.K. also purchased commercially produced alternative remedies to treat type 2 diabetes.

All the traditional Caribbean medicinal plants and remedies identified by study participants in this dissertation research were reported by the participants in the Mahabir and Gulliford (1997) study which was conducted in Trinidad. The medicinal plants that their study participants used to treat type 2 diabetes included caraili (Momordica charantii), cinnamon (Cinnamomum verum), aloe vera (Aloe vera and Aloe barbadensis), mauby (Colubrina arborescens), and celery (Apium graveolens). Study participants
mentioned that they also used cucumber (*Cucumis sativus*), garlic (*Allium sativum L.*), and tamarind leaf (*Tamarindus indica*) to control high blood pressure. In another smaller study conducted in Trinidad, participants identified *Momordica charanti* as a treatment for type 2 diabetes, while *Aloe vera, Aloe barbadensi*, and *Tamarindus indica* were used for hypertension and *Apium graveolen* was used as a heart tonic and low blood pressure (Lans 2006).

Similar to the finding of this dissertation research, Mahabir and Gulliford (1997) found that *Momordica charanti* was the most frequently used “bush medicine” to treat type diabetes by their Trinidadian study participants. In this dissertation research, 39 percent of study participants reported using *Momordica charantia*, compared to 28 percent of the study participants in the Mahabir and Gulliford (1997) study. In the Brown, Avis, and Hubbard (2007), Wint and colleagues (2006) and Delgoda and colleagues (2004) studies, cerasse was specifically mentioned as an important “bush” in Jamaica for treating colds and overall good health.

In this dissertation research, study participants stated that *Momordica charantia* was readily available because it grew naturally in Florida which has a comparable environment to the Caribbean. Study participants complained about the bitter taste of *Momordica charantia* when it was liquefied and consumed, but they still used it as a treatment to control glucose levels. *Momordica charantia* is also used to treat type 2 diabetes in traditional Chinese and Indian medicine (Chandra et al. 2008; Wang and Wylie-Rosett 2008). The use of a bitter liquid to treat the “sweetness” in the blood
suggests an attempt to restore harmony and balance to the body to control glucose levels which is likely to be cross-cultural health belief. Mexican Americans diagnosed with type 2 diabetes also report drinking bitter liquids from plants to treat the disease (Hunt, Arar, and Akana 2000). *Momordica charantia* may actually have biochemical properties that make it an effective treatment of type 2 diabetes. Recent biomedical studies (Kim and Kim 2008; Chandra et al. 2008; Nerurkar et al. 2008) found that due to its hypoglycemic properties that orally consumed *Momordica charantia* decreased glucose levels in diabetic rats.

In this dissertation study, cinnamon (*Cinnamomum verum*) was the second most frequently reported Caribbean medicinal plant used to treat type 2 diabetes. Study participants used the bark of *Cinnamomum verum* or purchased commercially produced pills from this plant. The research on the effectiveness of *Cinnamomum verum* for controlling type 2 diabetes has been inconclusive so far. Several studies with relatively small sample sizes have shown that the consumption of *Cinnamomum verum* pills has been associated with reduced glucose and lipid level (Khan 2003; Pham, Kourlas, and Pham 2007; Mang et al. 2006; Solomon and Blannin 2009). However, other research studies have found that the consumption of *Cinnamomum verum* pills did not have a significant effect on glucose level or HbA1c (Blevins et al. 2007; Tang, Larson-Meyer and Liebman 2008; Vanschoonbeek et al. 2008). Consequently, the consensus from the biomedical community is that *Cinnamomum verum* should not be recommended as a means of controlling glucose levels in patients diagnosed with type 2 diabetes (Baker et
al. 2008). However, the researcher’s perusal of the pharmacy shelves and Internet medical sources show that cinnamon has become a popular commercially produced alternative remedy to treat type 2 diabetes.

In many cultures including the Caribbean, there is a widely held belief that *Aloe vera* and *Aloe barbadensis* used topically as well as consumed orally havec health properties to treat a variety of illnesses and diseases (Boudreau and Beland 2006). In the Caribbean and Florida, *Aloe vera* and *Aloe barbadensis* species are easily grown and may be found growing in the unoccupied areas so they are inexpensive and easy to obtain by individuals who believe that they are effective means of treating type diabetes.

*Aloe vera* (*Aloe vera*, *Aloe barbadensis*) was the third most frequently reported Caribbean medicinal plant used to treat type 2 diabetes by study participants in this dissertation study and the Mahabir and Gulliford (1997) study. In this dissertation research, 17 percent of study participants reported using *Aloe vera* to treat type 2 diabetes compared to 15 percent of the study participants who used *Aloe vera* to treat type 2 diabetes in the Mahabir and Gulliford (1997) study. Studies have found that *Aloe vera* and *Aloe barbadensis* have hypoglycemic properties that reduce glucose levels in diabetic rats and mice (Ghannam et al. 1986; Noor et al. 2008; Tanaka et al. 2006). However, there have been few studies on the efficacy of *Aloe vera* on controlling glucose and lipid levels in human study participants diagnosed with type 2 diabetes. A recent study by Arora, Goyal, and Agarwal (2009) found that the consumption of juice from the *Aloe vera* plant by 28 study participants diagnosed with type 2 diabetes over a 3 month period
resulted in the significant reduction of HbA1c, glucose and lipid levels as well as BMI.

An earlier study by Bunyapraphastara and colleagues (1996) found that the consumption of juice from the Aloe vera plant by study participants diagnosed with type 2 diabetes reduced glucose and triglyceride levels.

In this dissertation research, mauby bark (Colubrina arborescens) was used by 17 percent of study participants to treat type 2 diabetes. Although Colubrina arborescens was identified as a medicinal plant in the Mahabir and Gulliford (1997) study, it was not used to treat type 2 diabetes. There has only been one study on the medical properties of the Colubrina arborescens (Alleyne et al. 2005). Alleyne and colleagues (2005) found that the consumption of a mixture of coconut (Cocos nucifera) water and Colubrina arborescens in the form of a syrup mixed with water reduced blood pressure.

Celery (Apium graveolen) was identified as an alternative treatment for type 2 diabetes by only 8.7 percent of study participants. Apium graveolen was also identified as a medicinal plant in the Mahabir and Gulliford (1997) study, but it was not used to treat type 2 diabetes. In addition to Momordica charantia, celery (Apium graveolens) is considered an officially approved herbal drug for the treatment of type 2 diabetes in China (Jia, Gao and Tang 2003). There is not a body of research on the medical properties of Apium graveolen. However, one study found that a diet that included Apium graveolen leaf reduced glucose levels in diabetic rats (Jelodar, Maleki, Sirus 2007).

Study participants’ cultural belief that traditional/alternative remedies were efficaciousness originated primarily from conversations with family members and
friends. Study participants reported that their family members and friends gained their cultural knowledge from their personal experience with type 2 diabetes and/or from their memories about the disease from their countries of origin. This cultural belief about the use of traditional Caribbean medicines to treat type 2 diabetes was given meaning by the collective memory within the Caribbean experience. It is this cultural meaning that influenced study participants’ decisions to use traditional/alternative remedies as a complementary treatment for type 2 diabetes.

The use of traditional/alternative remedies did not conflict with study participants’ use of the biomedical model to treat type 2 diabetes. Rather they integrated their cultural beliefs about type 2 diabetes into the biomedical model which resulted in the explanatory model identified by cultural consensus analysis in this dissertation research. Study participants attempted to adhere to the biomedical model of type 2 diabetes, but financial issues such as costs of medications and glucometer strips proved difficult to overcome. Study participants made regular three to four month physician visits, modified their traditional Caribbean diet according to biomedical dietary recommendations and to a lesser degree engaged in regular physical activity. Yet about half of the study participants strongly believed that traditional/alternative remedies along with utilizing the biomedical model would help them to more effectively treat type 2 diabetes and control their glucose levels.
Modified Caribbean Diet and Lifestyle

Study participants diagnosed with type 2 diabetes believed that a traditional Caribbean diet was not a good way to manage type 2 diabetes because this diet was high in fat and starch content and included large portion sizes. Consequently, women sought to modify their diets by reducing portion sizes of Caribbean foods and eating in moderation and preparing traditional dishes with less fat and oils. Caribbean dishes like callaloo and pelau are traditionally prepared with oil and coconut milk, respectively. In a U.S. focus group study, Bramble, Cornelius, and Simpson (2009) also found that Afro-Caribbean women substituted healthier ingredients for unhealthier ones in traditional Caribbean dishes.

Based on their responses, study participants attempted to follow the recommendations of their health care provider. These recommendations are based on the American Diabetes Association (2009) dietary recommendations for type 2 diabetes management which are based on the USDA food guidance system, “My Pyramid.” Study participants reported eating more vegetables and fruits along with chicken and fish, while reducing the consumption of sugars, starches, red meat and pork. They preferred to eat traditional Caribbean vegetables and fruits along with Caribbean meals.

Study participants admitted to being uncertain about portion sizes and that they occasionally ate traditional Caribbean foods with high fat content like Jamaican patties. They reported consuming processed foods like white rice and bread although recommended to limit their consumption by health care professionals. Study participants
found it difficult to reduce consumption of these foods because they were staples in traditional Caribbean diets. They also found it difficult to prepare Caribbean dishes with less fat when the whole family ate the same meals. Study participants stated that modifying their diets as the most challenging aspect about having type 2 diabetes. They would like to improve their diets so they could more effectively manage the disease.

This finding that study participants’ struggled to modify their traditional Caribbean diet is consistent with the three qualitative studies; Bramble, Cornelius, and Simpson (2009) conducted with Afro-Caribbean study participants in the U.S. and Brown, Avis, and Hubbard (2007) and Scott (1998) conducted with Afro-Caribbean study participants in the U.K. In these studies, study participants mentioned that Caribbean dishes had a lot of fat and oils and were traditionally served in the portion sizes were larger than those recommended by health professionals. Study participants also complained that the dietary recommendations were not consistent with their preferred diet of traditional Caribbean foods. These researchers concluded that the health care practitioners and dieticians were unfamiliar with the traditional Caribbean diet so they often recommended foods like pasta for fiber that were not viewed favorably in this population.

Food frequency and food diary studies have been conducted in Afro-Caribbean community in the U.S. and U.K. to determine energy intake and dietary consumption (Akbar 2007; Sharma et al. 1996; Sharma et al. 2002). Based on a food frequency study of Afro-Caribbean study participants in the U.K., Sharma and Cruickshank (2001) found
their diets to be comprised of high starchy carbohydrates with meat or fish. This study also noted when compared to the diets of British Europeans, English-speaking Afro-Caribbean participants consumed larger portions of high carbohydrate vegetables and prepared their meats by first frying them in oil. Sharma and Cruickshank (2001) suggested that sugar, and salt intake should be reduced in the traditional Caribbean diet. However, dietary guidelines have not been developed or implemented by health care practitioners who treat individuals in the Caribbean community in the U.K. or the U.S. Without nutritional values of traditional Caribbean foods and dishes, suggestions of substitutions for high fat foods, and estimation of appropriate portion sizes of Caribbean foods and dishes, health care practitioners and dieticians treating Afro-Caribbean individuals diagnosed with type 2 diabetes cannot offer culturally appropriate dietary recommendations to help this population effectively manage their glucose levels.

In this dissertation research, 31 (77.5 percent) study participants did not believe that living in the U.S. or a Caribbean lifestyle prevented the onset of type 2 diabetes or helped to control glucose levels. This finding contrasts with the study conducted by Brown, Avis, and Hubbard (2007) which found that Afro-Caribbean study participants believed that living in the U.K. contributed to the onset of type 2 diabetes and overall bad health. Study participants blamed the stress, racism, culture and climate in U.K. along with their diets which incorporated British foods as playing important role in the causation of type 2 diabetes. These study participants also believed that the stress-free environment, hot weather, and physical exercise which they perceived to be an integral
part of everyday Caribbean life would improve their glucose levels and their overall well being.

Study participants’ cultural belief that a modified traditional Caribbean diet was an effective treatment of type 2 diabetes was drawn from health care practitioners, family members, friends and/or from their memories from their country of origin. Study participants sought to draw on this collective memory to select Caribbean foods that they preferred to consume which they believed would help them effectively manage their glucose levels.

Yet study participants’ diet and lifestyle should be understood in the context of their socio-economic status and environment which influenced their choices about diet and physical activity as well as their overall health. Studies have shown that living in an urban environment is associated with higher rates of overweight, obesity, stroke, type 2 diabetes and CVD (Gillum 1997; Lopez 2004; Sobngwi et al. 2004). In urban neighborhoods where migrants are more likely to reside, the built environment acts as a barrier to accessing healthy foods and engaging in physical activity which contributes to these high rates of chronic diseases among low income individuals (Papas et al. 2007; Mojtahedi et al. 2008; Parks, Housemann, and Brownson 2003; Lopez and Hynes 2006).

The researcher visited study participants’ neighborhoods. From these visits, the researcher noted that study participants had to drive approximately five to 10 miles to purchase medicines, food, and other items. Study participants reported that they frequented the three Caribbean grocery stores in the area to purchased traditional
Caribbean food items. The researcher visited the two independent grocery stores in these neighborhoods and observed that they had a limited selection of fruits and vegetables and slightly higher prices for foods compared to upscale supermarket chains that are located in middle class neighborhoods of Tampa Bay. However, study participants could purchase low cost fruits and vegetables from two farmer markets located on the major thoroughfares surrounding these neighborhoods.

These findings about study participants’ working class neighborhoods are fairly consistent with studies that have concluded that low income urban neighborhoods have fewer supermarkets and grocery stores so their residents have to travel further to grocery stores (Lopez and Hynes 2006; Papas et al. 2007). Mojtahedi and colleagues (2008) also found that independent supermarkets and grocery stores in these neighborhoods often have higher prices and fewer selections of fresh fruits and vegetables, lean meats and other healthier food than upscale chain supermarkets in middle class neighborhoods. This finding was consistent with the finding of the study by Bramble, Cornelius, and Simpson (2009) in which Afro-Caribbean women residing in Baltimore, Maryland complained about the lack of access to fresh fruits and vegetables in their neighborhoods. The women stated that the corner grocery stores sold mainly junk food like potato chips and that their fruits and vegetables was wilted and unappealing (Bramble, Cornelius, and Simpson 2009). The finding that independent food stores sold less healthy and fresh foods than those required for managing type 2 diabetes led Horowitz and colleagues (2004) to recommend that health care practitioners, community and business leaders collaborate to
increase consumer demand for more nutritious foods and encourage food store owners to increase the availability of these foods.

In addition to limited access to healthy foods, low income urban neighborhoods are likely to have more pollutants, higher crime rates, a lack of sidewalks, inadequate and decaying recreational areas, and a lack of reliable public transportation which discourages leisure physical activity and social interaction (Lopez and Hynes 2006; Parks, Housemann, and Brownson 2003). In the study by Bramble, Cornelius, and Simpson (2009), Afro-Caribbean women residing in Baltimore, Maryland attributed that their lack of physical activity to the lack of recreational facilities and areas in their neighborhoods (Bramble, Cornelius, and Simpson 2009). Lopez and Hynes (2006) suggest that these urban issues can only be confronted through policies that address economic development, redevelopment of brownfields and income inequality. It is important that low income ethnic minority residents are not marginalized and pushed into neighborhoods where they have even less access to healthy foods and a better physical environment.

Observations of study participants’ neighborhoods suggest that the physical environment may also contribute to their failure to prioritize physical activity in their efforts to manage type 2 diabetes. In these working class neighborhoods, the streets were narrow with no sidewalks making it unsafe for physical activities such as walking or biking. Street lights were sparse which made it difficult to engage in physical activity early in the morning or in the evening after work. Also, there were no recreational areas for physical activity located within walking or reasonable driving distance in these
neighborhoods. While detailed data on physical activity and environment was not collected in this dissertation research, it is likely that narrow streets along with the lack of sidewalks, street lights, and recreational areas were barriers to study participants engaging in recreational physical activity. Building sidewalks, adding street lights and affordable recreational programs in these neighborhoods would encourage its residents to participate in leisure physical activity (Humpel, Owen, and Leslie 2002; Sallis, Bauman, and Pratt 1998).

Consequently, study participants’ cultural beliefs about the benefits of modifying traditional Caribbean diets as well as living in working class urban neighborhoods challenged their ability to effectively manage type 2 diabetes and likely contributed to their high BMI.

**Prayer and Faith**

For study participants, prayer and their Christian faith were considered an important means of effectively controlling type 2 diabetes. Study participants prayed for their overall emotional and physical well being as well as praying specifically about type 2 diabetes. Only two women believed that prayer and faith could result in a cure of type 2 diabetes and it complications. Prayer was considered to be complementary to the use of prescribed oral hyperglycemic agents and biomedical care along with making positive dietary and lifestyle changes. The axiom “God helps those who help themselves” represents the study participants’ belief that they had to “do the right thing” so that their prayer and faith could work. Only one woman who was using traditional/alternative
remedies only to treat the type 2 diabetes believed that prayer was the primary component in her disease management.

Prayer and faith provided emotional comfort during stressful times as study participants struggled to cope with the impact of type 2 diabetes and its complications on their lives. Prayer and faith helped women to move past the fear and shock of their type 2 diagnosis and provided the strength to cope with the disease’s impact on a daily basis. It should be noted the Jamaican physician in whose private practice several study participants were recruited for this dissertation research professed strong Christian faith. Religious music played in the private practice’s waiting area which was decorated with posters and pictures with biblical quotations. Two of the study participants interviewed attended the same church as the Jamaican physician which is why they chose him as their primary care health care provider. In these interviews, these two study participants suggested that it was the Jamaican physician’s religious faith that gave them confidence in his treatment and advice for managing type 2 diabetes.

This finding about the importance of prayer and faith as a coping strategy in study participants’ management of type 2 diabetes and its complications was also found in the Scott (1998) and Brown, Avis, and Hubbard (2007) studies of Afro-Caribbean study participants diagnosed with type 2 diabetes in the U.K. In Hunt, Arar, and Akrana (2000), Mexican Americans diagnosed with type 2 diabetes reported that prayer was a complementary treatment to controlling type 2 diabetes. Prayer and faith gave these Mexican American study participants the emotional strength to deal with the stress and
anxiety of type 2 diabetes. They considered biomedical treatment of type 2 diabetes to be the manner by which God helps them treat the disease.

In this dissertation research, study participants’ belief in the effectiveness of prayer and faith in the management of type 2 diabetes did not conflict with their use of biomedical treatment. Their prayers and faith provided emotional comfort and acceptance of type 2 diabetes diagnosis and even increased attentiveness to managing the disease in some cases.

**Structural Barriers to Type 2 Diabetes Care**

The primary structural barrier to study participants obtaining regular type 2 diabetes care was inadequate health insurance coverage. Inadequate health insurance coverage prevented them from having access to affordable medicines, physician visits and the testing strips required to use the glucometer for self-monitoring of glucose levels. Study participants who engaged in transnational migration had access to health care in their country of origin. However, when they migrated to the U.S. for extended periods of time, their access to type 2 diabetes care became erratic and in some cases non-existent.

In a capitalistic society, structural barriers inhibit individuals from acting on their cultural beliefs and practices (Dressler 2004; D'Andrade 1995). Here the power structure places limits on choices available to individuals who have low socioeconomic status or are marginalized due to a disability, age or immigrant status. The study participants diagnosed with type 2 diabetes interviewed in this dissertation research were of low socioeconomic status and had limited or no health insurance.
**Inadequate Health Insurance Coverage**

Inadequate health insurance coverage is a structural barrier created by socioeconomic status and influenced the decisions that study participants made about managing type 2 diabetes. Twenty one (52.5 percent) study participants in this dissertation research had health insurance in the U.S. that assisted in payment for their medications and physician visits and with higher payments for the glucometer testing strips. Of the 19 (47.4 percent) women without health insurance, nine women resided primarily in the U.S. Study participants’ lack of health insurance was due to unemployment, self-employment and holding jobs which did not provide health insurance. These women paid cash for their medications, physician visits and glucometer testing strips. Study participants with and without health insurance purchased their medications through pharmaceutical generic programs like Wal-Mart or directly from their physician. The costs of three to four month laboratory blood tests also added to the financial burden of treating type 2 diabetes for study participants.

Study participants with health insurance estimated that their co-payments for medications and physicians were $15 to $25. However, their health insurance deductibles that caused the amount of their co-payments fluctuate, sometimes leading to unexpected costs. Even with health insurance coverage, study participants found the costs of prescribed medicine expensive due to other diagnosed medical conditions linked to type 2 diabetes and older age such as hypertension and arthritis. Study participants who engaged in transnational migration had limited access to health care because they had no health
insurance when living in the U.S. With the exception of two women, the cost of the glucometer testing strips was prohibitive for all the study participants.

Study participants without health insurance in the U.S. accessed inexpensive or free health clinics and relied on friends and family to help them negotiate their type 2 diabetes care. Study participants with no or inadequate health insurance also sought out Caribbean physicians and health care practitioners for medical care. Through these social networks, several women were able to obtain health care. A 62 year old behavioral coach with no health insurance and severe vision impairment because of retinopathy received free treatments on her eyes from a specialist after a mutual friend arranged the initial appointment.

In Hillsborough County, study participants who are U.S. citizens or lawful permanent residents and have no health insurance coverage have limited health care options. The Judeo Christian Health Clinic (2009) offers health care to individuals considered “medically indigent.” To receive treatment from this clinic, individuals must have no health insurance and must show proof that their household incomes fall below federal poverty guidelines. The clinic also requires that non-U.S. citizens show proof of lawful permanent residency to be eligible for treatment. Individuals must go to the clinic early in the morning to make same day appointments. This clinic is located in West Tampa which approximately 10 miles from study participant’s neighborhoods.

None of the study participants without health insurance mentioned receiving services from this clinic. When the researcher suggested Judea Christian Health Clinic as
a possible source of health care to a 50 year old child care worker who had stopped participating in the Hillsborough County HealthCare Program after losing her job, she said that she had heard about the clinic, but that it was located too far away for her to go during a weekday as she was working part-time. A 35 year old health insurance agent without health insurance also cited the distance of Judea Christian Health Clinic from her home and workplace as the reason that she had not used their health care services and preferred to negotiate her own care through her contacts with a private physician.

The Hillsborough County HealthCare Program (2009) is a low cost health care option available to study participants who are 1) U.S. citizens or lawful permanent residents, 2) residents of Hillsborough County, 3) not eligible for any other health insurance coverage including Medicare or Medicaid, and 4) have incomes below the federal poverty guidelines. The Hillsborough County HealthCare Program covers “medically necessary” services as well as pharmaceuticals. There are no monthly payments, but members are required to make some co-payments for specified services including pharmaceuticals. After meeting with a case manager and enrolling in the program, members can receive services from several primary health care sites; the ones located in and around study participants’ neighborhoods are St. Joseph's Community Care - MLK Clinic, Family Care Clinic, and St. Joseph’s Women Hospital. None of the study participants who were U.S. citizens or residents without health insurance coverage were participating the Hillsborough County HealthCare Program. The researcher recommended the Hillsborough County HealthCare Program to these study participants,
the majority said that they had heard of the program, but were vague about the reasons why they had not take steps to enroll.

Study participants who are visiting the U.S. on tourist visas and have no health insurance coverage have limited medical care options available in Hillsborough County. One source of low cost health is Tampa Family Health Centers (2009) a not-for-profit organization, which has six clinics located in and around the working class neighborhoods in which most study participants reside. In addition to offering a variety of medical, pharmaceutical and dental services, Tampa Family Health Centers focuses on providing diabetes and CVD care to individuals with low income. Tampa Family Health Centers accepts private insurance, Medicare, Medicaid as well as the Hillsborough County HealthCare Plan. However, the Tampa Family Health Centers also treats individuals without health insurance, charging them on a sliding scale based on income ($15 to $40). Patients who receive extra services like lab tests will be billed at a discounted rate based on their income. Tampa Family Health Centers allows appointments to be made over the telephone at the patients’ convenience and patient may receive continuity of care. One study participant, a 68 year old cook with Medicare received diabetes care from the one of the Tampa Family Health Centers’ clinics near her neighborhood.

Two study participants who did not have health insurance coverage, a 35 year old health insurance agent and a 50 year old child care worker stated that they visited the Doctor’s Walk-in Clinic located on the periphery of their neighborhoods. The Doctor’s
Walk-In Clinic is a private health care company that provides primary care and has eight locations in the Tampa Bay region. The Doctor’s Walk-In Clinic accepts patients without health insurance coverage; charge approximately $50 per visit as well as the cost of laboratory tests. Both study participants visited the Doctor’s Walk-In Clinic to have blood glucose tests done and renew prescriptions for oral hypoglycemic agents. They both purchased their medications through Wal-Mart’s generic pharmaceutical program.

In cases of emergencies, all study participants regardless of immigration status can receive treatment in the emergency rooms of St. Joseph’s Women Hospital and University Community Hospital which are located on the periphery of their neighborhoods. These two hospitals charge low income patients on a sliding scale.

The finding that inadequate health insurance coverage in the U.S. is the main structural barrier to accessing type 2 diabetes is consistent with studies that have shown that the lack of health insurance is associated with poor type 2 diabetes care (Ayanian et al. 2000; Pollitz 2005). Effective type 2 diabetes management requires regular biomedical care so individuals unable to afford adequate health insurance to cover the costs of physician visits, medications, and glucometer strips are likely have poor glucose control. In the U.S., the health disparities found among Caribbean and Latino populations have been associated with low socioeconomic status, low education attainment, and racial discrimination (Smith and Barnett 2005; Williams, Neighbors, and Jackson 2003). Consequently, Caribbean populations in the U.S. at high risk for type 2 diabetes are more likely to have low socioeconomic status and limited or no health insurance coverage.
In the U.S., the capitalist health care system demands that individuals have resources to obtain health care. Type 2 diabetes is an incurable disease that requires long term management which places a financial burden on individuals diagnosed with the disease. Study participants had low socioeconomic status which resulted in them having health insurance coverage with high co-payment for medicines and physician visits and rarely covered the expensive glucometer testing strips required to self-monitor glucose level. Study participants without health insurance patched together type 2 diabetes care through low income clinics and hospital emergency visits and networking through the community. With varying success, study participants used their social networks to navigate these structural barriers to obtain medical care for type 2 diabetes and its complications.

Transnational Migration

Thirteen (32.5 percent) study participants diagnosed with type 2 diabetes interviewed in this dissertation research engaged in transnational migration. Transnational migration is labor migration within the global capitalistic system. Conway (2007) uses the “mooring” concept to describe the mobility and global cross-border multicultural familial networks and decision-making of Caribbean transnational migration where these migrants have continuous strong ties to their communities in two or more geographic areas. While upper class or wealthier Caribbean migrants have been engaging in transnational migration in the 21st century, the incomes of study participants placed them in the lower income classes. Study participants were retired from a variety of
careers that included nursing, teaching as well as working in the government civil services. They had pensions that were their main source of income in their country of origin along with financial support from friends and family. They had children who had migrated to the U.S. and other children and immediate family who remained in their country of origin which kept them tied to societies in both geographic locations.

Study participants provided child care to their families while living the U.S. The women cared for grandchildren and great-grandchildren for extended periods of time (4 to 6 months) which allowed Caribbean families to have reliable and inexpensive child care. This finding was consistent with a British study which described the role of Afro-Caribbean grandmothers as the “international flying grannies” (Plaza 2000). As the role of Afro-Caribbean grandmothers in Britain as long term child care providers declined, Plaza (2000) found that these women began to travel to the U.S. and Canada for one to six months to provide child care and fulfill other social support roles to their families who had migrated to these countries. The length of time that study participants engaged in transnational migration can stay in the U.S. is constrained by immigration regulations which only permits a six month stay on a visitor’s visa issued by the U.S. embassy in the country of origin. Although study participants were vague about the financial remuneration that they received for their child care duties or other employment, they readily admitted that they were reliant on their families for everyday and unexpected expenses that included health care.
Caribbean transnational migration has been studied through the lens of identity, social roles and politics, and remittances (Benson 2006; Connell and Conway 2000; Itzigsohn 2000). There is a dearth of literature about the impact on the health of individuals engaging in this type of migration from the Caribbean. While it is difficult to determine definitively how the type 2 diabetes status of Afro-Caribbean women is affected by engaging in transnational migration, it likely declines due to the stress of migration, changes in their social network and employment, and a search for access to health care services as indicated by a study on migration and AIDS/HIV+ individuals suggests that (Lieb et al. 2006). Transnational migrants do not receive continuity of care for type 2 diabetes and other health conditions. Mainous and colleagues (2004) found that continuity of care at a health care site or with a health care provider is associated with good glycemic control.

Study participants who engage in transnational migration had access to public and private health care in their home countries. Both Jamaica and Trinidad and Tobago have public and private health care sectors. The public health care sector is funded by the government and provides free health care services and a limited number of free pharmaceuticals to its citizens at government health centers and hospitals (Mullings and Paul 2007; Jamaican Gleaner 2008; Pan American Health Organization 2001; Gulliford and Mahabir 2001). The private health care is comprised of corporations providing health insurance as well as privately owned hospitals and medical practices. Study participants who engaged in transnational migration received at least six months of their health care in
Jamaica and Trinidad and Tobago. These study participants discussed their experiences in using health care in both the public and private sectors. They complained about long waiting times to see physicians at the government health centers and hospitals. As a result, their preferred to use the more expensive private health care sector where they claimed to receive more immediate and reliable health care services. While in Trinidad and Tobago, study participants obtained type 2 diabetes medications for free through the CDAP program. Study participants living in Jamaica purchased their type 2 diabetes medications through a government discount program.

Living in the U.S., study participants had no health insurance; only limited health care is available for migrants on visitor visas in the U.S. Thus, study participants had no means to readily access prescribed oral hypoglycemic agents or insulin, type 2 diabetes care or any other required health care. To evade the structural barrier that transnational migration presents, study participants used their social networks to obtain care in “emergency” situations. Friends and family in the U.S. drew on their resources which included finances and established relationships to help women navigate and gain type 2 diabetes care for the disease and its complications.

Wolf (1982) argues that the power and class structure determines the prior and current resources that are available to migrants in their new environment. Study participants drew from their resources in both geographical locations to ensure biomedical and informal type 2 diabetes care. These resources included the prescribed oral hyperglycemic agents and other traditional/alternative remedies that the women
brought from their country of origin as well as the social network that they used in the U.S. to obtain type 2 diabetes care. Caribbean grocery stores also provided women with a regular source of vegetables, fruits and seasonings, some of which are used as traditional/alternative remedies.

Bourdieu (1984) argues that individuals engage in agency within the power structure and can adapt and incorporate the power structure into their decision-making. Study participants’ development and utilization of social networks in the U.S. to seek and obtain type 2 diabetes care can be viewed through this conceptual framework. Although they did not have health insurance, study participants had access to regular type 2 diabetes care including free prescribed oral hyperglycemic agents in their home countries. Ultimately, it is the power and class structure in the U.S. that limits the health care choices available to study participants who engage in transnational migration.

Obesity and Overweight

Even considering the misclassification which underestimates obesity and underweight in the study population, a high proportion of study participants were obese (39.39 percent) and overweight (30.3 percent). The age-adjusted prevalence of obesity of the study population was 40.39 percent which is higher than age-adjusted prevalence of obesity of non-Hispanic blacks, (35.7 percent), but similar to the age-adjusted prevalence of obesity of non-Hispanic black women (39.2 percent) (Pan et al. 2009). These obesity prevalence rates reported by Pan and colleagues (2009) on behalf of the CDC are likely
underestimated because they were based on self-reported height and weight data from the Behavioral Risk Factor Surveillance System (BRFSS) surveys.

The high prevalence of obesity found in this dissertation research is consistent with the high prevalence of obesity and overweight in Afro-Caribbean populations in the Caribbean and in the U.K. (Abbotts and Cruickshank 2004; Ford and Mokdad 2008; Hennis et al. 2002; Fraser 2001; Fraser 2001; Riste, Khan Cruikshank 2001; Rotomi et al. 1995). These studies also found that Afro-Caribbean women had higher rates of obesity than Afro-Caribbean men.

Along with the high proportion of obesity and overweight individuals in the study population, there was also a high proportion of hypertension. Eight (61.54 percent) of the 13 obese study participants had hypertension. This finding is consistent with studies (Nemensure, Suh-Yuh, and Hennis 2008; Abbotts, Harding, and Cruickshank 2004; Cruickshank et al. 2001) conducted with Afro-Caribbean populations in the Caribbean and in the U.K. which show a high prevalence of hypertension along with obesity and type 2 diabetes.

Abdominal obesity in women is a strong predictor of CVD, hypertension and type 2 diabetes and is associated with insulin resistance and hyperlipidemia (Evangelista and McLaughlin 2009; Ulijaszek, and Lofink 1996; World Health Organization 2000). As stated previously, the WHO considers individuals with abdominal obesity and two other characteristics which include hypertension and obesity to have the metabolic syndrome (Alberti, Zimmet, Shaw 2006). Individuals with the metabolic syndrome are at risk for
CVD, coronary heart disease, myocardial infarction and cerebrovascular incident (Groop 1999). In the modern Caribbean, CVD, type 2 diabetes and cerebrovascular disease are leading causes of death which suggests that there may be a high prevalence of the metabolic syndrome among Afro-Caribbean populations as well as other ethnic groups in the Caribbean (Caribbean Epidemiology Centre 2005; Ezenwaka 2007; Tull 2005). Obesity has also been associated with sleep apnea and sleep breathing order (Strollo and Rogers 1996).

Obesity can complicate the treatment of it co-morbidities; hypertension, type 2 diabetes, CVD, heart failure, dyslipidemia, and other metabolic diseases (Evangelista and McLaughlin 2009; Kaplan 1998; Redon 2001). As a debilitating medical condition, obesity increases the strain on cardiac function through increases in total blood volume and cardiac output which results in a slightly raised heart rate, higher arterial pressure, left ventricular hypertrophy (LVH), thickening of the myocardium of the left ventricle of the heart and other cardiac structural abnormalities (Alpert 2001; Lavie, Milani, and Ventura 2009).

Obesity complicates the treatment of hypertension because the underlying insulin resistance decreases the efficacy of antihypertensive agents, thereby requiring the patient to use more of these medicines (Kaplan 1998; Redon 2001). Obese individuals with hypertension are also more likely to develop LVH and have kidney damage than non-obese hypertensive individuals (Redon 2001). Paradoxically, overweight and obese individuals diagnosed with hypertension, heart failure, coronary heart disease, and
peripheral arterial disease have more positive short and long term outcomes than leaner individuals (Lavie, Milani, and Ventura 2009).

There are conflicting findings about the association between obesity and mortality risk in individuals diagnosed with type 2 diabetes. One large study shows no or weak association (Chaturvedi et al. 1995), but more recent studies show a positive association (Eeg-Olofsson et al. 2009; Mulnier et al. 2006; Rogers, Hummer, Krueger 2003). Obesity in individuals diagnosed with type 2 diabetes 65 years and older may be protective and reduced mortality risk although it limits physical activity (Weiss et al. 2009; Zoppini et al. 2003). Yet weight loss and physical activity along with prescribed medicines have been shown to delay onset of type 2 diabetes, reduce arterial pressure, improve cardiac function, and reverse cardiac structural abnormalities (Alpert 2001; Knowler et al. 2002; Milani and Lavie 2003).

The ADA recommends that individuals with pre-diabetes or type 2 diabetes lose weight because even a 5 percent body weight loss can improve insulin resistance, decrease glycemic and lipid levels, reduce blood pressure, and lower risks of co-morbidities such as CVD even though the long term outcomes are not fully known (American Diabetes Association 2008). Counseling, education, reduced energy, carbohydrate and fat dietary content along with physical activity are recommended as components of a successful lifestyle invention plan for individuals with type 2 diabetes to lose weight and maintain weight loss (American Diabetes Association 2008).
The literature on migration and acculturation on the weight gain among Latinos as well as issues surrounding continuity of care suggest that the high BMIs found among study participants may also be related to their migration experiences. The rates of type 2 diabetes among Latinos have been associated with acculturation as well as a lack of quality of care (Mainous et al. 2007; Hazuda et al. 1988). Latinos diagnosed with type 2 diabetes were more likely to be less acculturated than their counterparts who were more acculturated (Mainous, Diaz, and Geesey 2008). Yet more acculturated Latinos diagnosed with type 2 diabetes were more likely to have less healthy diets with lower fiber and high saturated fat than less acculturated Latinos diagnosed with the disease. However, more acculturated Latinos were able to obtain better quality of type 2 diabetes care than their less acculturated counterparts (Hazuda et al. 1988).

Latinos, and especially, Latinas are more obese than non-Latino whites (Pan et al. 2009). Obesity and weight gain among Latinos has been found to be associated with acculturation, specifically the length of time that they have lived in the U.S. The longer Latino migrants live in the U.S., the more weight they gain (Park et al. 2007; Goel et al. 2004; Himmelgreen et al. 2004; Kaplan et al. 2004; Gorden-Larsen et al. 2003; Sundquist and Winkleby 2000; Hazuda et al. 1991). Himmelgreen and colleagues (2004) found that the BMI of low income Puerto Rican women in Hartford, Connecticut increased the longer they lived (≥ 10 years) in the U.S. In addition, women born in Puerto Rico who spoke fluent to good English had significantly higher BMIs than their counterparts who did not speak English as well (Himmelgreen et al. 2004). Fitzgerald and colleagues
Kaplan and colleagues (2004) found that Latino migrants who had lived in the U.S. for \( \geq 15 \) years were four times more likely to be obese than their counterparts who had lived in the U.S. for \( \leq 5 \) years. Goel and colleagues (2004) analyzed the 2000 National Health Interview Survey and found that Latino immigrants who lived in the U.S. for \( \geq 15 \) years were two times more likely to be obese than Latino immigrants who lived in the U.S. for \( \leq 1 \) year.

In the U.S., the traditional Latino diet, particularly the Mexican American diet, is based on grains and legumes. However, there is high consumption of meat, fat and sugar along with a low consumption of fruits and vegetables (Marks, Garcia, and Solis 1990). First generation Latinos who were less acculturated had healthier diets than second generation Latinos who were more acculturated (Duffey et al. 2008; Montez and Eschbach 2008; Yeh et al. 2008; Benavides-Vaello 2005; Satia-Abouta et al. 2002; Bermúdez, Falcón, and Tucker 2000). Latino migrants reported consuming healthier foods in their home countries where fresh fruits and vegetables were more readily available (Edmonds 2005; Cason, Nieto-Montenegro and Chavez Martínez 2006; Gray et al. 2005). Their diets in the U.S. expanded to include the consumption of hamburgers and pizza which were not regularly eaten in their home countries (Himmelgreen et al. 2007; Edmonds 2005). They also reported consuming more fat and less fruit than they did in their home countries (McArthur, Anguiano, Nocetti 2001; Neuhouser, et al. 2004).
Latino women were also reluctant to purchase unfamiliar fresh fruits and vegetables because they were uncertain about how to prepare them and were concerned about squandering money on foods their families might not eat (Cason, Nieto-Montenegro and Chavez-Martinez 2006; Gray et al. 2005). In addition, Latino migrants consumed more fast food than in their home countries because it was convenient, inexpensive, and preferred by their children (Himmelgreen et al. 2007; Edmonds 2005; Cason, Nieto-Montenegro and Chavez-Martinez 2006).

Lack of physical activity increases the risk of obesity and type 2 diabetes (American Diabetes Association 2008). Latinos reported a more sedentary lifestyle with a decrease in daily physical activity compared to their lifestyle in their home countries (Himmelgreen et al. 2007). However, less acculturated Latinos were less likely to engage in leisure physical activity than their more acculturated counterparts (Abraído-Lanza et al. 2005; Crespo et al. 2001). Evenson, Sermiento, and Ayala (2004) found that Latinas born in Mexico who lived in the U.S. for > 3 years were two times more likely to be physically active than their counterparts who lived in the U.S. for less time and were less acculturated.

Other studies have found that high rates of chronic diseases among Latinos are more strongly associated with socioeconomic indicators such as access to health care than acculturation (Hajat, Lucas, Kingston 2000; Solis 1990). In addition, low income Latinos ate less expensive foods that tended to be high in carbohydrates and fats. They also lived in neighborhoods where fresh fruits and vegetables were difficult to obtain (Horowitz et
al. 2004; Zenk et al. 2009). However, Hazuda and colleagues (1988) found that acculturation was more strongly associated with type 2 diabetes and obesity and Latinos than socioeconomic status. Although this dissertation did not measure acculturation, a review of the literature on the health of Latinos suggests that acculturation may have played a role in high obesity prevalence found among study participants because their mean length of residence in the U.S. was 20 years. However, a more careful examination of study participants’ diet and physical activity levels at different number of years living in the U.S. would be required to learn more about how acculturation has impacted their weight and overall health.

Another finding of this dissertation research was that study participants with higher BMIs were younger at age of type 2 diabetes diagnosis than women with lower BMIs. Obese and overweight study participants were younger at the age of type 2 diabetes diagnosis compared to their counterparts who were normal weight. Also, study participants who were normal weight were approximately 10 years older (69.5 years) than obese and overweight study participants (~60 years). These findings suggest that despite their accumulated cultural knowledge about type 2 diabetes and attempts to modify their diets and lifestyle, younger study participants struggled to maintain their weight. The lower BMI of older study participants may reflect the weight loss that occurs in women over the age of 60 years or a generational difference rather than disease management.
Studies have shown that in the U.S. where most of the population has a sedentary lifestyle, men and women gain weight starting around early and middle age with women gaining more weight than men (Ryan 2000; Guo et al. 1999; Carmelli, McElroy, Rosen 1991). In addition to weight gain, there is an increase of body fat in the abdominal region along with a loss of fat-free mass and a decrease of muscle mass (Ryan 2000; Guo et al. 1999). Even if their weight remains stable, the body fat of women increases post- and peri-menopause due to hormonal changes (Guo et al. 1999). However, Baumgartner and colleagues (1995) found that weight slightly declines around 60 years of age in men and after 60 years of age in women. This is consistent with the finding that the mean age of study participants who were normal weight (69.7 years) was noticeably higher than their counterparts who were overweight (59.6 years) and obese (60.8 years) or both (60.3 years). Another explanation for the lower weight of older study participants may be generational differences in diet and lifestyle compared to their younger counterparts. Most of the older study participants were retired and therefore, they were more likely to prepare their own meals and consume less fast food, particularly since they did not have young children in the home.

Weight gain is associated with a decreasing base metabolic rate and declining energy expenditure (Kuk et al. 2009). With age, the basal fat oxidation, the ability of the body to breakdown fat into energy, declines leading to weight gain, particularly in women and obese individuals (Solomon et al. 2008; Calles et al. 1995). Weight gain occurs in even active individuals because oxygen uptake can cause aerobic fitness to
decline (Solomon et al. 2008; Williams and Wood 2005). Increasing physical activity and consuming fewer calories is required to balance this weight gain (Williams and Wood 2005). Yet even following these recommendations, women are less likely to lose weight than men because of hormonal changes and increased energy intake (Williams and Wood 2005; Westerterp and Goran 1997). Therefore, the weight gain associated with aging may explain the higher BMIs of study participants who were ≤ 60 years of age and study participants who were younger at the age of type 2 diabetes diagnosis.

Weight gain has also been associated with type 2 diabetes treatment, particularly the use of oral hyperglycemic agents, sulfonylurea and thiazolidinedione and insulin intake (Cohen et al. 2008; U.K. Prospective Diabetes Study Group 1995). The intake of insulin has been associated with significant weight gain (Cohen et al. 2008; Mäkimattila, Nikkilä, and Yki-Järvinen 1999). The weight gain associated with the intake of insulin is related to the increased hypoglycemic episodes and decreased HbA1c levels. Studies have found that this weight gain is not greater than an individual’s weight prior to insulin intake or type 2 diabetes diagnosis (Cohen et al. 2008; Nichols and Gomez-Caminero 2007). This suggests that individuals with high glucose levels experienced weight loss due to dehydration caused by frequent urination as well as a breakdown of muscle (American Diabetes Association 2008). Consequently, the weight gain associated with insulin intake may be the body weight returning to an equilibrium (Cohen et al. 2008).

To prevent weight gain, the preferred medication prescribed to overweight and obese diabetic patients is Metformin. Metformin suppresses appetite and reduces
hypoglycemic episodes, thus leading to weight loss (Cohen et al. 2008; Mäkimattila, Nikkilä, and Yki-Järvinen 1999; DeFronzo and Goodman 1995). Metformin is prescribed along with insulin to prevent any excess weight gain that may occur with taking insulin (Mäkimattila, Nikkilä, and Yki-Järvinen 1999; Yki-Järvinen et al. 1997). In this dissertation research, 36 (90 percent) of the 40 study participants were taking prescribed oral hyperglycemic agents, 24 (66.6 percent) of these women were taking Metformin. Only six (15 percent) study participants were taking insulin to control type 2 diabetes and three (50 percent) of these women were also taking Metformin. Therefore, the increase in BMI found in women who were younger at the age of diagnosis is not likely associated with the intake of insulin to control type 2 diabetes.

Thus, type 2 diabetes management and the overall health of study participants who are obese and overweight in this dissertation research would benefit from a lifestyle intervention that includes nutritional advice about modifying their traditional Caribbean diets and advice that stresses the importance of incorporating rigorous physical activity in their daily routines. Tutill and colleagues (2007) found that individuals diagnosed with type 2 diabetes could lose weight following dietary advice regardless of the prescribed pharmacological treatment. However, it is important that health care practitioners consider the socioeconomic and political barriers that prevent their diabetic patients from eating healthy and engaging in physical activity when providing lifestyle intervention.
Limitations

This dissertation research had several limitations that influenced the data collection process and analysis of study participants’ socioeconomic status, cultural beliefs about type 2 diabetes, and the self-reported anthropometric data. These limitations are reviewed next.

Researcher as Native Anthropologist

In anthropology, the term “native anthropologist” is used to describe a formally trained anthropologist or key informant viewed as an insider because he or she is a member of the ethnic population under study (Jones 1970; Narayan 1993). There is the assumption that the study population would be more likely to be honest and confide in the native anthropologist as an “insider.” The concept of the native anthropologist developed in response to the European male anthropologist as the outsider conducting fieldwork in the colonial era (Narayan 1993). Franz Boas was one of the first anthropologists to train indigenous informants as anthropologists and to encourage women to become anthropologists with the goal of collecting sensitive information that the anthropologist may be unable to gather as “outsider” (Jones 1970). Boaz believed that the advantage or strength of the native anthropologist was that he or she was more likely to be considered trustworthy by the study population and be given access to information that they would be reluctant to share with a male European anthropologist as the outsider (Jones 1970). Additionally, the native anthropologist as insider is believed to have intimate cultural
knowledge about the study population and that familiarity would result in a more accurate interpretation of cultural beliefs and practices (Ohnuki-Tierney 1984).

The dichotomous view of the anthropologist as the insider versus the outsider has been criticized as failing to consider the shifting cultural identities and power relations as well as the other drawbacks that anthropologists experience when studying their own culture (Narayan 1993; Ohnuki-Tierney 1984; Jones 1970). Narayan (1993) argues that gender, education status, class, ethnicity, social contacts, religion, and regional origin can prevail over the cultural identity traditionally considered an advantage for the native anthropologist. These hybrid/multiple identities intersect with cultural attitudes about class, global and political relations and influence how the study population perceives or interacts with the native anthropologist. For example, study participants may be reluctant to admit to a native anthropologist perceived to have a higher education and/social status that they use traditional healers or other healing methods outside of the biomedical model.

In conducting field work, Jones (1970) argues that anthropologists considered outsiders can have an advantage because their lack of cultural knowledge may lead them to ask questions that the native anthropologist may overlook. Native anthropologists may not ask these questions because their vast cultural knowledge sometimes makes them view the answer is “obvious” when in fact, the responses may be unexpected and unfamiliar. Consequently, native anthropologists should be cautious not to enter fieldwork assuming that they have cultural knowledge about any given topic and that
they are merely setting the record straight (Jones 1970). After all, Narayan (1993) notes that native anthropologists cannot know everything about every cultural domain in their own culture. Jones (1970) also points out another advantage that the anthropologist as outsider may have is that the study population may give them answers to questions that they would not give native anthropologists because they assume that as insiders, they already know the information or that the answer is “obvious.” Native anthropologists should, therefore, be aware of how their cultural identities, own biases, and the biases of the study population towards them influence how research is conducted in the field. Native anthropologists are also challenged to distance themselves intellectually and affectively from their cultural experiences and meanings when conducting field work (Ohnuki-Tierney 1984).

The researcher of this study, a woman of African descent from Trinidad and Tobago, was a native anthropologist sharing the ethnicity and gender of the study population. As an insider of this study population, the researcher entered the field believing that recruiting and gathering data about cultural attitudes about type 2 diabetes and anthropometric measurements from women of African descent from the English-speaking Caribbean would not be difficult. However, initially the researcher was not able to enlist enthusiastic participants.

The researcher is responsible for 24 of 40 interviews being conducted over the telephone and for the failure to collect the anthropometric measurements from study participants. The researcher conducted telephone interviews with women who
rescheduled interviews several times. It was more convenient for these women and the researcher to conduct these interviews over the telephone. The researcher asked the first 13 study participants to allow the anthropometric measurements to be taken. The researcher then asked these study participants and those who recruited after to self-report their height and weight. The researcher failed to cultivate a relationship with these women so that they could have been persuaded to allow the anthropometric measurements. The researcher should have spent more time establishing a rapport with these women and been more persistent in setting up in person interviews. If this rapport had been established and the interviews conducted in person rather than over the telephone, the researcher might have been more likely to persuade women to allow the anthropometric measurements to be taken. This failure to collect the anthropometric data and high number of telephone interviews conducted is the responsibility of the researcher who should have developed strategies to overcome the issues that emerged in the field.

The researcher also acknowledges that her own cultural background which encourages respect for elders contributed to her reluctance to press study participants to conduct interviews in person and insist on taking the anthropometric measurements. Most of the women recruited were older than the researcher. The researcher called these women by honorifics such as “Miss” as dictated by cultural expectations of respect from a younger person to an elder. The researcher attempted to cajole the women to cooperate in all aspects of the data collection, but did not pursue the matter forcefully as required to collect the data successfully. This research experience shows that an anthropologist
conducting research in his or her own culture faces numerous challenges that can impact adequate collection of data (Jones 1970). It is important that the anthropologist consider these issues prior to entering the field and develop potential strategies to deal with these potential obstacles to successful data collection.

**Selection Bias**

Selection bias may have occurred in this dissertation research because of the purposeful and convenient sampling strategy used to recruit study participants. Selection bias occurs when there is a systematic error in the recruitment of study participants (Delgado-Rodríguez and Lorca 2003; Gordis 2000). The systematic error which is independent of sample size can lead to an overestimation or underestimation of the measured variable (Tripepi et al 2007). Selection bias can negatively impact the internal validity of a study resulting in inaccurate estimates and invalid conclusions about measured associations (Tripepi et al 2007; Gordis 2000).

This dissertation research found that there was no significant difference between the cultural knowledge of study participants with and without medical training who shared a cultural belief about type 2 diabetes that closely resembled the biomedical model. However, it is possible that the high level of biomedical knowledge of the study population was due to selection bias. The majority of the study participants were recruited through a private medical practice owned Jamaican and Haitian physicians and through other educated individuals from the Caribbean, some of whom had medical training and strong links to the health care industry. So even if a study participant did not
have medical training, their biomedical knowledge about type 2 diabetes could have been influenced by their relationships with these medical professionals. Consequently, the study participants recruited for this dissertation research may have had a higher degree of biomedical knowledge than women in the wider study population as a result the cultural consensus analysis identified a cultural belief model about type 2 diabetes similar to the biomedical model.

The private medical clinic and networking through the local Caribbean association were the most effective ways for recruiting women for this dissertation research. On reflection, the sample strategy could have been improved and the possibility of selection bias decreased by recruiting study participants through low income medical clinics and churches where physicians and pastors viewed as respected authority figures could encourage women from various backgrounds to participate in the study. The recruitment area could have also been widened to include south Florida where there are larger concentrations of English-speaking Caribbean communities of Jamaicans, Trinidadians and Guyanese in Broward and Miami-Dade Counties.

*Information Bias: Misclassification*

Information bias occurs when the information about study participants is inaccurate because there were flaws and inadequacies in the data collection methods (Gordis 2000). Misclassification is the main form of information bias and can adversely impact a study’s internal validity. Misclassification bias occurs when there is a measurement error that leads to the incorrect classification of a study participant’s
exposure status (Gerhard 2008; Gordis 2000). There are two forms of misclassification bias; differential misclassification and nondifferential misclassification (Delgado-Rodríguez 2004; Gordis 2000). Differential misclassification occurs when misclassification takes place at different rates within the study population e.g. higher rates of misclassification in the cases than in the controls in a case control study (Gerhard 2008). Nondifferential misclassification occurs when the inaccuracy in the data collection method leads to similar rates of misclassification across groups within the study population (Gordis 2000).

In this dissertation research, study participants were asked to self-report their height and weight measurements which may have resulted in nondifferential misclassification. A source of information bias, reporting bias contributed to the misclassification in this study. Reporting bias is the reluctance of study participants to accurately report an exposure because of perceived negative societal attitudes (Delgado-Rodríguez 2004; Gordis 2000). Previous studies (Engstrom 2003; Brunner Huber 2007) have shown that women consistently overestimate their height and underestimate their weight due to negative social attitudes about weight and body size. Consequently, the BMI calculations are likely underestimate the prevalence of obesity and overweight in the study participants. To address misclassification bias, an adjustment was made to lower the obesity threshold to 29.2, however, since the sample size is small and this technique has not been tested by other studies, it is difficult to assess its effectiveness (Dauphinot et al. 2008). Both the misclassification and reporting biases can be addressed by researchers
conducting the anthropometric measurements in a rigorous manner using a stadiometer and accurate scale.

The researcher taking the anthropometric measurements systematically would have given a more representative picture of these women’s biological health. Given that this population is severely understudied in the U.S., these data would have been an important contribution to the literature on the health of English-speaking Afro-Caribbean communities. The data could have also been correlated with their individual cultural knowledge scores as well as other socio-demographic variables to determine if there was significant relationship. Since almost all the women expressed the belief that weight loss was important for controlling their glucose levels, determining if there was a significant relationship with BMI and hip to waist ratio would have been given some insight into how beliefs translate into behaviors.

Another source of information bias is that six study participants were related to each other; two pairs of sisters and one mother and daughter. One of the main assumptions of cultural consensus analysis is that respondents answer questions independently from each other (Weller 2007). Although each individual responded independently to the cultural consensus questionnaire, their familial relationship may have resulted in the similar responses to the question. These similar responses may have increased the level of agreement which led to the cultural consensus analysis finding a single cultural belief model about type 2 diabetes. In addition, their shared biologies and
experiences with type 2 diabetes could have resulted in similar findings that negatively impacted the internal validity of this study.

*External Validity*

The findings of this dissertation research may not have external validity and therefore, may not be generalizable to the wider community of English-speaking Afro-Caribbean women diagnosed with type 2 diabetes. For a research study to have generalizability or external validity, the sample must be representative of all the individuals in that group diagnosed with the disease (Gordis 2000). Since there are no statistics about the women of African descent from the English-speaking Caribbean diagnosed with type 2 diabetes in the U.S., it is difficult to determine if this study population is a representative sample of all of these women or if it diverges substantially from the characteristics of this group.

However, an examination of the 2000 U.S. Census shows that the study population has a comparable household income (~$28,000) to the population as a whole. According to the 2000 U.S. Census, 21 percent of the women of West Indian ancestry (includes Dutch and French West Indies) are registered nurses or work in health care support occupations. In the study population, 27.5 percent of women were currently or retired registered nurses or employed in health care support occupations as nursing assistants and therapists. Thus, the study sample is slightly over representative of women employed in the health care industry and they are likely to have more biomedical knowledge about type 2 diabetes than other women in this population. Consequently, it is
difficult to generalize the findings of this dissertation research to all English-speaking Afro-Caribbean women diagnosed with type 2 diabetes living in the U.S. However, the inclusion of Jamaican and Trinidadian women diagnosed with type 2 diabetes who engaged in transnational migration suggests that the findings capture the dynamic nature of an often mobile Caribbean community.

Sample Size

A power analysis was not conducted *a priori* this dissertation research. Power analysis is used to determine the sample size that is necessary for a statistical test to detect significance where significance exists (Cohen 1988). Power, significance level, sample size, and effect size are integral components that must be balanced for testing the null hypothesis (Singh 2006). Power is the likelihood of making a Type II error i.e., the probability of not finding significance when it exists (Madrigal 2008). The general consensus is that power should be 80 percent to increase the probability of finding significance (Singh 2006). The significance level (α .05) is the level at which the null can be rejected to detect a significant difference. Sample size determines the validity of a study and should be decided during the planning state (Cohen 1988). The effect size measures the strength or meaningfulness of a relationship found by the statistical test (Singh 2006).

Nonparametric tests like Spearman correlation analysis require larger sample sizes because they are more sensitive and have fewer assumptions (Kraemer and Thieman 1987). However, the sample size in this dissertation research was large enough for the
Spearman correlation analysis to find two significant inverse relationships where $H_0 = 0$. The significant relationships were that study participants with higher BMI and individual cultural knowledge scores were significantly younger at age of type 2 diabetes diagnosis than women with lower BMI and individual cultural knowledge scores.

A power analysis was conducted to determine the appropriate sample size for the study to have the power to detect significance. In the power analysis, the Spearman correlation coefficients at significance in this dissertation research were used as the effect sizes because the effect size for the correlation analysis is coefficient $r$ (Cohen 1988; Singh 2006; Kraemer and Thieman 1987). It is generally accepted that the small, medium and large effect sizes for the correlation coefficient are .10, .30 and .50 respectively (Cohen 1988). The effect sizes, $\alpha .05$, and 80 percent power were entered into the program to determine the sample size required to yield a significant result. This analysis was conducted in Power and Precision v.2, a statistical program developed to perform power analyses.

The results of the power analysis indicate that using -.043 as the effect size, the proposed sample size is 37. This study will have power of 80.4 percent to yield a significant result for a 2 tailed correlation analysis; a 1 tailed correlation analysis will have power of 88.4 percent. When -.041 is used as the effect size, the proposed sample size is 41. This study will have power of 80.1 percent in order to yield a significant result size for a 2 tailed correlation analysis; for a 1 tailed correlation analysis, the proposed sample size was 40 and this study will have power of 87.4 percent. Thus, future studies
with a research design involving correlation analysis similar to this dissertation research should have a minimum of 41 study participants to have the power of 80 percent to yield significant results at $\alpha .05$.

**No Access to Medical Records**

The researcher did not have access to the results of study participants’ most recent fasting glucose tests and other medical records. Instead, women were asked what their physician reported about the status of their glucose levels based on their last test results. Study participants’ glucose levels could have been correlated with their individual cultural knowledge scores as well as other socio-demographic variables to determine if there was significant relationship (Daniulaityte 2004). This knowledge would have informed the researcher about which study participants had their glucose levels under control and whose decision making based on their cultural beliefs and practices were more successful in managing type 2 diabetes.

**Lack of Detailed Physical Activity and Environment Data**

The lack of detailed data about study participants’ physical activity and physical environment prevents a comprehensive analysis of how study participant manage type 2 diabetes. Thirty five (87.5 percent) of the study participants expressed ambivalence about engaging in physical activity. They were reluctant to provide detailed information on their physical activity or shrugged off the question. Visits to study participants’ neighborhoods, suggests that the physical environment prevents them from engaging in
leisure physical activity and accessing affordable healthy foods. However, this analysis cannot conclusively provide insight into the extent of how physical activity or the physical environment plays a role in study participants’ lives, beyond concluding that physical activity is not a priority for these study participants.

*No Data on Severity of Sequelae*

It is likely that study participants suffering from severe type 2 diabetes sequelae such as blindness/visually impairment have more challenges than study participants not suffering from such serious sequelae. Although data were collected from study participants’ other medical conditions, they were not asked how these conditions impacted their management of type 2 diabetes. Analysis of these data would have provided a valuable insight into the various challenges that these study participants confront the burden of type 2 diabetes and its sequelae in their daily lives.
Chapter VI – Conclusion

Using a medical anthropological approach, this dissertation research investigated the socioeconomic status and cultural beliefs about type 2 diabetes of Afro-Caribbean women diagnosed with the disease. Self-reported anthropometric measurements were used to calculate and categorize study participants’ BMI.

The cultural consensus analysis along with the analysis of semi-structured interviews and socio-demographic data showed that study participants shared a single cultural belief model about type 2 diabetes. The prevalence of type 2 diabetes in the U.S. and the English-speaking Caribbean along with public health awareness and prominent discussion in the media has played an important role in contributing to their cultural knowledge about type 2 diabetes. Study participants indicated that they retained the cultural beliefs and practices from their country of origin, such as using alternative Caribbean medicines modifying their traditional Caribbean diets and lifestyle. They explained that their cultural beliefs about type 2 diabetes were based on memories of events that occurred in their country of origin, personal experiences, and their interactions with Caribbean friends and family. Study participants have incorporated the biomedical approach to managing type 2 diabetes from exposure to the media as well as experiences with the health care practitioners in their host society and home countries.
The concept of hybrid cultures proposed by Nestor Garcia Canclini (1995) explains the complex relationship between tradition and modernity in Latin America. Garcia Canclini (1995) argues that rather than give up traditional beliefs and practices for modernity, individuals should adapt their traditional knowledge to successful function in modern society. Individuals do not abandon their traditional beliefs despite the social inequalities and political struggles that occur in a capitalistic society. Culture is not autonomous or static. Crossing borders of countries creates fluid social networks of towns, ethnic groups, and cultures that result in a hybrid cultural identity. In capitalist societies, race and class structures impose restrictions upon the expression of an individual’s cultural beliefs and identity.

For study participants, this hybrid cultural identity causes them to reorient their ethnic identity as they adjust to the racial categorizations of the U.S. which are different from those in their countries of origin. Within this race and class structure, study participants developed a shared cultural belief model about type 2 diabetes that reflects a hybridity of cultural and medical experiences drawn from both U.S. and English-speaking Caribbean cultures. They have maintained strong ties to their local Caribbean communities as well as their country of origin. Study participants engaged in transnational migration have established social networks in the U.S and their country of origin. The borders of the U.S. and the Caribbean nations are fluid for these women. They move across these borders with strong social and financial connections to friends and family.
The high proportions of obesity and overweight in the study population along with the finding that study participants with higher BMI was significantly younger at age of type 2 diabetes diagnosis than women with lower BMI suggests that these women struggled to modify their traditional Caribbean diet and were unable to incorporate regular physical activity into their daily lives. Studies examining the diets of Afro-Caribbean populations in the U.K. and the English-speaking Caribbean show the high consumption of animal fat, carbohydrates, sugar and salt which have contributed to the high prevalence of metabolic response diseases (Albert et al. 2007; Sharma et al. 1996; Sharma and Cruickshank 2001). Study participants need culturally appropriate dietary guidelines about reducing fat and carbohydrate content as well as how to determine portion sizes of their preferred traditional diets (Albert et al. 2007). Given the study participants’ negative and/or ambivalent attitudes towards physical activity, it is vital that health care practitioners stress the value of incorporating regular physical activity into their daily lives.

The health of study participants was further compromised by their other medical conditions. Study participants suffered from hypertension, high cholesterol, and CVD which suggests the presence of the metabolic syndrome. Retinopathy has caused five study participants to become blind and severely impaired their vision causing a decline in their quality of life as well as frustration. These medical conditions increased both their need for biomedical care and reliance on their social networks to circumvent these barriers to obtain needed medical care.
Study participants’ cultural and health experiences must be contextualized with the wider capitalistic society taking into consideration the class, labor, and power structure. Study participants were low income and resided in working class neighborhoods. They had inadequate health insurance coverage in most instances which negatively impacted their ability to access the biomedical health care system and effectively manage type 2 diabetes. They struggled to meet the costs of medicines and physician visits and the testing strips required to use the glucometer for self-monitoring of glucose levels. Transnational migration was another structural barrier that prevented some women from obtaining regular medical care in the U.S. The physical environment of study participants’ neighborhoods may have also played a role in preventing them from accessing healthy foods and engaging in recreational physical activity required to effectively manage type 2 diabetes. Study participants and their support networks developed informal strategies to overcome the challenges to structural barriers. However, it is clear that they were not always successful as they continued to struggle to gain regular access to type 2 diabetes care to prevent the onset of the disease’s complications.

The English-speaking Caribbean is facing an epidemic of chronic diseases that have negatively impacted the health of its populations. The proponents of thrifty genotype hypothesis posit that genetics is the underlying cause of the type 2 diabetes epidemic in modern populations under environmental stress, while the proponents of the thrifty phenotype hypothesis contend that undernutrition in utero is responsible for type 2 diabetes in adulthood. These biological processes and evolutionary forces play a not yet
determined role in the high mortality and morbidity of type 2 diabetes found in English-speaking Caribbean peoples. Benyshek, Martin and Johnston (2001) argue that some researchers promoting the genetic causes of the type 2 diabetes in Native Americans and high risk populations ignore the complex environmental and biological processes at work. Understanding how political economic forces interact with biological processes can lead to the development of preventative and treatment interventions for these populations (Benyshek, Martin and Johnston 2001).

The inclusion of women engaged in transnational migration and the similarities to the findings of other qualitative studies of English-speaking Afro-Caribbean population diagnosed with type 2 diabetes in the U.K. and U.S. suggests that the findings of this dissertation research can contribute to the literature, serve as the baseline for further health studies of this population, and positively contribute to the design and implementation of effective treatment and prevention interventions for type 2 diabetes in the community.

**Recommendations**

Given the high risk for type 2 diabetes and quality of life issues facing English-speaking Caribbean migrants diagnosed with the disease, the researcher makes the following recommendations for public health officials and health care practitioners providing type 2 diabetes care to the English-speaking Caribbean community. These interventions would be most effective if leaders of the English-speaking Caribbean
community, health care practitioners, churches and politicians provide both financial and social support.

1. A collaboration of health practitioners, dieticians, and Caribbean community associations should develop a health promotion and awareness strategy to support healthy diets and encourage physical activity among Caribbean women and men suffering from type 2 diabetes as well as other chronic diseases:
   a) A community-based cooking and nutrition education program based on the Canadian Diabetes Association’s “Cooking for Your Life!” can be adapted to meet the dietary needs of the Caribbean community (Nichol, Retallack, and Panagiotopulos 2008). With the guidance of a dietician, this program would provide Caribbean women and their families with cooking classes at community events and churches. These classes would instruct them about how to prepare healthier traditional Caribbean dishes. Women would be shown how to substitute ingredients that are low in fats and oils and reduce salt in these dishes. They would also be shown how to measure portion sizes and provided with nutritional information materials to determine calorie content of traditionally eaten Caribbean foods. They would also be given kitchen scales to take home to help them to measure ingredients and portion sizes.
b) Weekly support meetings at churches that incorporate prayer and bible study session with discussions about how manage type 2 diabetes effectively. In addition, these meetings should organize physical activities and provide a healthy Caribbean meal. Nutritional information materials about Caribbean foods should be distributed to participants attending the meeting.

c) Provide safe places such as churches and community locations to engage in physical activity. Dance and physical activity instruction accompanied by Caribbean music can make physical activity enjoyable and familiar.

d) Since many of the individuals diagnosed with type 2 diabetes have physical disabilities such as visual impairment and limited movement, weekly home delivered healthy Caribbean meals and basic food items such as wheat bread, wheat rice, and beans would contribute to improving their diets. Prayer and discussions about type 2 diabetes can be an important element of these home visits.

e) The elderly and individuals with disabilities require transportation to medical appointments as well as help performing everyday routine tasks like shopping at the grocery. Community associations can provide transportation through volunteers as well as help them access HartPlus Paratransit, public transportation services for individuals with disabilities.
2. Caribbean organizations and businesses need to partner with public health officials to develop and distribute type 2 diabetes awareness and education materials to the Caribbean community. Caribbean businesses and advocacy groups are advised to create hard copy materials that can be prominently displayed at meeting places and businesses. Additionally, the Caribbean community should avail itself of other communications mechanisms including, but not limited to public service announcements on radio, commercial and local access television channels. Emerging media like blogs and social networks may also provide useful information in raising public awareness about type 2 diabetes and preventive measures. The materials need to focus on how to modify and prepare traditional Caribbean diets and provide the nutritional values of popular Caribbean meals. Caribbean organizations should also sponsor type 2 diabetes awareness events for members of the community.

3. Primary care providers should ask their Caribbean patients about their use of traditional/alternative remedies to control their glucose levels. Primary care providers should become familiar traditional Caribbean traditional/alternative remedies as well as commercially produced herbal therapies and remedies. This will give primary care providers knowledge to discuss side effects, contraindications, or potential interactions of these traditional/alternative remedies.
4. Health care practitioners should stress the importance of incorporating physical activity into type 2 diabetes management. These discussions should recognize that the physical environment of low income neighborhoods may be a barrier to engaging in recreational physical activity. Therefore, it is insufficient for health care practitioners to simply recommend physical activity; they must work with individuals to develop creative and realistic work out routines.

5. Type 2 diabetes care should include regular consultations with a dietician familiar with traditional Caribbean diets and their nutritional values. Afro-Caribbean women need professional guidance to modify traditional Caribbean diets in order to successfully control their glucose levels.

6. Caribbean community leaders should ally with neighborhood associations and churches to petition the county and state to build sidewalks, add streetlights and recreational facilities and parks to make it safer and more convenient to engage in physical activity.

7. Public health officials must work cooperatively with health policy makers, health insurance companies, and pharmaceutical companies to develop strategies to subsidize the costs of glucometer testing strips as well as prescribed medicines that treat type 2 diabetes and associated conditions such as hypertension.
8. Caribbean organizations should ally with local public health officials to develop a network of physicians and public health services to provide type 2 diabetes care to members of the community. This is especially important for those members who engage in transnational migration which impedes regular access to health care for some members of the community. The researcher has had preliminary discussions with members of the Caribbean Community Association’ health committee about implementing these recommendations in the Tampa Bay region Caribbean community.

**Contributions to Biocultural Anthropology Framework**

In addition to biological and evolutionary processes, culture plays an important role in understanding human biological conditions within the biocultural anthropological framework. However, cultural beliefs and practices must not be overly romanticized, or exaggerated. Rather, they must be understood within the power structure of a capitalistic society. Dressler (2005) argues that biocultural anthropological perspective should incorporate new ideas about culture from culture theory as well as recently developed research methods to study culture rather than continue to view culture as a nebulous concept.

One approach to studying and incorporating culture theory into the biocultural anthropological framework has been to draw on theoretical concepts from the field of cognitive anthropology. As noted previously, the cultural consensus theory involves identifying cultural models in which are individuals’ shared beliefs in a variety of cultural
domains such as lifestyle and diseases. The biocultural anthropological framework recognizes that the political economy forces have an impact on biological conditions on both the macro and micro level and vice versa.

This dissertation research also contributes to the literature in biocultural anthropology framework by operationalizing cultural theory and political economy theory of health to study the socioeconomic status and cultural beliefs about type 2 diabetes of Afro-Caribbean women diagnosed with the disease. Socioeconomic factors such as inadequate health insurance and the physical environment have played an crucial role in the health of study participants and other migrant communities. The power structure of the capitalist society impedes study participants’ ability to access needed type 2 diabetes care and preferred diet and lifestyle choices by limiting access to healthy foods and spaces to engage in physical activity.

This dissertation research also contributes to the literature about cultural consensus theory by using cultural consensus analysis to test the hypothesis that women of African descent from the English-speaking Caribbean diagnosed with type 2 diabetes share a cultural belief model. Cultural consensus analysis has not been used previously to determine the cultural beliefs of individuals from the English-speaking Caribbean. The finding that these women share a cultural belief model about type 2 diabetes supports and buttresses the validity and reliability of cultural consensus analysis.

After identifying the cultural belief model, the dissertation research used qualitative methods to identify the main cultural beliefs that Afro-Caribbean women
acted on to manage type 2 diabetes (Dressler 2005). The biocultural anthropological perspective holds that cultural beliefs are constrained by the power structure so this dissertation research used qualitative methods to identify the structural barriers that prevented Afro-Caribbean women from receiving type 2 diabetes care. This dissertation research explored how socioeconomic status can constrain the type 2 diabetes care available to study participants who were members of the English-speaking Afro-Caribbean community.

**Contributions to Applied Anthropology**

The field of applied anthropology seeks to use anthropological research and theory to develop practical solutions to real world human societal problems. Applied anthropologists work in myriad fields in the U.S. and globally. Medical anthropology is the study of how health issues including diseases affect cultures. Anthropologists in the field of applied medical anthropology make recommendations guided by anthropological research to public health officials and policy makers to develop and implement interventions to improve the health status of subject populations.

This dissertation research contributes to applied medical anthropology by conducting research on English-speaking Afro-Caribbean women diagnosed with type 2 diabetes. Scholarly articles will be produced from this research and published in journals that are read by health care practitioners and public health officials who provide health care services to the English-speaking Afro-Caribbean communities. This dissertation research also makes specific recommendations to health care practitioners treating this
population about how to improve their type 2 diabetes care. Recommendations were also made to English-speaking Caribbean community organizations to increase the social and practical support to these women, some of whom are engaged in transnational migration.

**Further Research**

Future research on socioeconomic status and cultural beliefs about type 2 diabetes among Afro-Caribbean immigrant populations should include cross-cultural studies conducted across the English-speaking Caribbean diaspora. Study populations should be located, for example in Miami, New York, Toronto, Canada, and London, United Kingdom. These four cities have large English-speaking Caribbean populations that would inform the validity of the cultural belief model identified in this dissertation research. A cross-cultural study would benefit from a larger sample size that includes equal numbers of men and women to determine if gender differences exist. The biological component of this study should include blood pressure and anthropometric measurements that were not taken in this study. In addition, such a study should determine if the structural barriers that prevent Afro-Caribbean women in this dissertation research from obtaining type 2 diabetes care also exists in these other communities. The use of GIS to map the physical environment would provide invaluable insight regarding the barriers to accessing healthy foods and engaging in physical activity.

Research about type 2 diabetes in the English-speaking Caribbean community should also include the interviews of physicians and health care practitioners who provide
services to members of the Caribbean community diagnosed with the disease and at risk for the onset of the disease. Interviews with English-speaking Caribbean physicians should include questions about their attitudes towards traditional medicines such as *Momordica charantia* and their diabetic patients’ use of these traditional/alternative remedies.

Informal conversations with the Jamaican physician at whose private practice several study participants were recruited, revealed that he was cognizant of the structural barriers confronting English-speaking Caribbean patients diagnosed with type 2 diabetes as well as the cultural beliefs about the disease. He attempted to help them circumvent these barriers by charging nominal visitation fees and providing insulin at a discounted cost. He also expressed strong religious faith and belief in prayer which resonated with his patients. It would be interesting and instructive to investigate whether or not English-speaking Caribbean health care practitioners share this recognition of the structural impediments as well as the cultural beliefs that make it difficult for their patients to effectively manage type 2 diabetes. Previous research has indicated that physicians and health professionals treating Mexican-Americans diagnosed with type 2 diabetes lacked this awareness (Hunt, Arar and Larne 1998). These data can be used to publish scholarly articles that raise awareness among these health practitioners.

Another area that needs further research is the role of social family support of Caribbean women diagnosed with type 2 diabetes. This dissertation research touched upon Afro-Caribbean women’s social and familial support. The findings suggest that
although study participants do not speak extensively about the disease with family and friends, they do have networks that provide them with the financial support to help them cope and manage type 2 diabetes. Research conducted on Latino populations in the U.S. indicated that social support played an important role in effective type 2 diabetes management (Gleeson-Kreig, Bernal and Woolley 2002).

It is crucial that research be conducted on that efficaciousness of traditional Caribbean medicines that are used by the English-speaking Caribbean community to treat type 2 diabetes. Biochemical compositions of these plants such as the widely used *Momordica charantia* should be studied in human clinic trials to determine if they have any benefit for treating type 2 diabetes.

Finally, future research should involve closely examining the modified traditional English-speaking Caribbean diet using food frequency questionnaires and food diaries. The women in this study were uncertain about how to alter the preparation of traditional dishes and how to moderate portion sizes. English-speaking Caribbean immigrant communities and populations in their country of origin should be educated about CFNI’s food groups that incorporate traditional Caribbean foods and provided with low fat and carbohydrate substitutes along with portion guides.
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Appendices
Appendix A: IRB Approval

May 2, 2008

Chrsy Sans
Dept. of Anthropology
SOC 107 AAREA

RB: Expedited Approval for Continuing Review
IRB#: 105737
Title: Impact of Cultural Beliefs, Acculturation and Socioeconomic Status on Type 2 Diabetes Risk among English-Speaking Afro-Caribbean Female Immigrants in Florida

Dear Ms. Smith:

On April 25, 2008, Institutional Review Board (IRB) reviewed and APPROVED the above protocol for the period indicated above. It was the determination of the IRB that your study qualified for expedited review based on the federal expedited category number 6 and 7. Also approved was the informed consent form. Please provide a copy of your current human subjects protection education certificate.

Please note, if applicable, the enclosed informed consent/assent documents are valid during the period indicated by the official, IRB-Approval stamp located on page one of the form. Valid consent must be documented on a copy of the most recently IRB-approved consent form. Make copies from the enclosed original.

Please reference the above IRB protocol number in all correspondence regarding this protocol with the IRB or the Division of Research Integrity and Compliance. In addition, we have enclosed an Institutional Review Board (IRB) Quick Reference Guide providing guidelines and resources to assist you in meeting your responsibilities in the conduction of human participant research. Please read this guide carefully. It is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-9343.

Sincerely,

Paul G. Stiles, J.D., Ph.D., Chairperson
USF Institutional Review Board

Enclosures: (If applicable) IRB-Approved, Stamped Informed Consent/Assent Document(s)
IRB Quick Reference Guide

OFFICE OF RESEARCH  •  DIVISION OF RESEARCH INTEGRITY & COMPLIANCE
INSTITUTIONAL REVIEW BOARDS, FWA NO. 0001669
University of South Florida  •  12901 Bruce B. Downs Blvd., MC235  •  Tampa, FL 33621-4598
(813) 974-5638  •  Fax (813) 974-5618

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Appendix B: Research Flyer

Living with Sugar:
Socioeconomic Status and Cultural Beliefs about Type 2 Diabetes among Afro-Caribbean Migrants

Who:
We are recruiting Afro-Caribbean people with type 2 diabetes (sugar) between the ages of 35 years and 90 years to participate in a research study.

Why:
This research is being done to understand how cultural beliefs, acculturation and socioeconomic status impact Afro-Caribbean people living with sugar.

Benefits and Risks:
You may or may not benefit from being in this study. The primary benefit is to gain new knowledge. If you take part in this study, you may help others in the future.

What:
If you decide to participate in this study, you will be asked to respond to questions about your socio-demographic status, medical background and cultural beliefs about sugar. You will also be interviewed about how living with sugar impacts your daily life.

How:
If you or anyone you know might be interested in participating, please contact us for more information!

Chrystal Smith, MAA, MPH
University of South Florida
Tel: 813-974-1356 or 813-984-8466
Email: csmith5@mail.usf.edu
USF IRB# 105737
Appendix C: Recruitment Script

Living with Sugar:
Socioeconomic Status and Cultural Beliefs
about Type 2 Diabetes among Afro-Caribbean Migrants

Hello!

I am recruiting Afro-Caribbean woman with type 2 diabetes (sugar) between the ages of 35 years and 90 years to participate in a research study. This research is being done to learn how socioeconomic status, cultural beliefs, and acculturation impact Afro-Caribbean woman living with sugar.

If you decide to participate in this study, you will be asked to respond to questions about your socio-demographic status, medical background and cultural beliefs about sugar. You will also be interviewed about how living with sugar impacts your daily life.

Your participation in the study is completely voluntary. You can choose to be in the study or not. This research is totally separate from the care you are receiving here at the physician’s office and whether or not you decide to participate in the research study won’t affect your care.

If you would like to participate in this study, please fill out your contact information below. If you have any more questions about this process or if you need to contact me about your participation, I may be reached at 813-974-1356 or 813-984-8466.

Name: _______________________

Tel no: _______________________________________________________

Chrystal Smith, MAA, MPH
University of South Florida
Tel: 813-974-1356 or 813-984-8466
Email: casmith5@mail.usf.edu
USF IRB# 105737
Appendix D: Informed Consent Form

Informed Consent to Participate in Research
Information to Consider Before Taking Part in this Research Study

Researchers at the University of South Florida (USF) study many topics. To do this, we need the help of people who agree to take part in a research study. This form tells you about this research study.

We are asking you to take part in a research study that is called: Living with Sugar.

The person who is in charge of this research study is Chrystal Smith.

Other research personnel who you may be involved with include: N/A.

The research will be done over the telephone or at locations throughout the community that are convenient for you as a participant.

Purpose of the study
The purpose of this study is to discover if Afro-Caribbean migrants share cultural beliefs about the disease’s cause, treatment and symptoms and how these beliefs along with their cultural experience and socioeconomic status impacts their type 2 diabetes risk.

Study Procedures
If you take part in this study, you will be asked to complete three questionnaires. The first questionnaire will gather information about your socio-demographic status such as age, education, number of children, income as well as diabetes-related behavior and medical history. The second questionnaire will ask about your beliefs about type 2 diabetes (sugar). The third questionnaire about acculturation will ask questions such as how many of your friends are from the Caribbean and if you listen to Caribbean music. Each of these questionnaires will take approximately 15 minutes to 20 minutes to complete.

Additionally, you will be asked in depth questions about your knowledge about type 2 diabetes (sugar) and how the disease affects your life. Follow up interviews about coping type 2 diabetes (sugar) will be conducted with one specific participant on a monthly basis until the end of the study. These interviews will take approximately 25 to 40 minutes and will be recorded and transcribed later.

The researcher will take anthropometric measurements (weight, height, hip and waist circumferences) from all participants or ask participants to self-report their height and weight.

Alternatives
You may choose not to participate in this research study.
Appendix D: (Continued)

**Benefits**
We don’t know if you will get any benefits by taking part in this study. However, your participation in this study may inform the scientific community of what programs and opportunities can improve the lives of Caribbean women with type 2 diabetes.

**Risks or Discomfort**
There are no known risks to those who take part in this study.

**Compensation**
We will not pay you for the time you volunteer while being in this study.

**Confidentiality**
Your privacy and research records will be kept confidential. However, certain people may need to see your study records. By law, anyone who looks at your records must keep them completely confidential. The only people who will be allowed to see these records are:

- The research team, including the Principal Investigator
- Certain government and university people who need to know more about the study.
  - For example, individuals who provide oversight on this study may need to look at your records. This is done to make sure that we are doing the study in the right way. They also need to make sure that we are protecting your rights and your safety. These include:
    - The University of South Florida Institutional Review Board (IRB) and the staff that work for the IRB. Other individuals who work for USF that provide other kinds of oversight may also need to look at your records.
    - The Department of Health and Human Services (DHHS).

The results of this study may be published. However, the data obtained from you will be combined with data from others in the publication. The published results will not include your name or any other information that would personally identify you in any way.

Confidentiality of records will be maintained by assigning participant code numbers. Only project staff will have access to the data. All data will be secured by the researcher. At the end of the project, all data will be kept for 3 years. At that time, all data will be destroyed.

**Voluntary Participation / Withdrawal**
You should only take part in this study if you want to volunteer. You should not feel that there is any pressure to take part in the study, to please the investigator or the research...
Appendix D: (Continued)

staff. You are free to participate in this research or withdraw at any time. There will be no penalty or loss of benefits you are entitled to receive if you stop taking part in this study.

Questions, concerns, or complaints
If you have any questions, concerns or complaints about this study, call Chrystal Smith at 813-984-8466 or 813-974-9412.
If you have questions about your rights, general questions, complaints, or issues as a person taking part in this study, call the Division of Research Integrity and Compliance of the University of South Florida at (813) 974-9343.

Consent to Take Part in this Research Study

It is up to you to decide whether you want to take part in this study. If you want to take part, please sign the form, if the following statements are true.

I freely give my consent to take part in this study. I understand that by signing this form I am agreeing to take part in research. I have received a copy of this form to take with me.

_____________________________  _______________________
Signature of Person Taking Part in Study            Date

_____________________________
Printed Name of Person Taking Part in Study

Statement of Person Obtaining Informed Consent

I have carefully explained to the person taking part in the study what he or she can expect.

I hereby certify that when this person signs this form, to the best of my knowledge, he or she understands:

• What the study is about.
• What procedures/interventions/investigational drugs or devices will be used.
• What the potential benefits might be.
• What the known risks might be.

I also certify that he or she does not have any problems that could make it hard to understand what it means to take part in this research. This person speaks the language that was used to explain this research.
Appendix D: (Continued)

This person reads well enough to understand this form or, if not, this person is able to hear and understand when the form is read to him or her.

This person does not have a medical/psychological problem that would compromise comprehension and therefore makes it hard to understand what is being explained and can, therefore, give informed consent.

This person is not taking drugs that may cloud their judgment or make it hard to understand what is being explained and can, therefore, give informed consent.

____________________________________  ______________________
Signature of Person Obtaining Informed Consent       Date

____________________________________
Printed Name of Person Obtaining Informed Consent
Appendix E: Socio-Demographic Questionnaire

Socio-Demographic/Medical History/Behavioral Questionnaire

**DEMOGRAPHICS:** To begin, I would like to know a little bit about you and your thoughts about living in this city in Florida.

Participant’s name: ______________________________________________________________

Address: ______________________________________________________________________

Phone: __________________________ Email:__________________________________________

1. Age:____________ Date of birth _______________________

2. Ethnicity: _________________________________________________________________

3. Country of Origin:__________________________________________________________

4. Place of birth: _____________________________________________________________

5. Marital Status: _____________________________________________________________

6. Immigration Status:________________________________________________________

7. How long have you lived in the U.S.? _________________________________________

8. How long have you lived in Florida? __________________________________________

9. Where did you live before moving to Florida? _________________________________

10. How often do you visit your country of origin in the Caribbean? _______________

11. What is the highest grade of school that you have completed? _________________

12. How many children do you have? ___________________________________________

13. How many people live in your household? ___________________________________
Appendix E: (Continued)

14. How many people over 18 years live in your household? ______________________

15. How many children under 18 years live in your household? ______________________

16. Do you live in an apartment or house? ______________________

17. Is your home rented or owned? ______________________

18. What is your religion? (such as Baptist, Catholic, 7th Day Adventist, etc.)

19. How frequently do you attend church services? ______________________

20. Thinking about your total household income, which category would you say you fit into?

1) $10,000 per year or less
2) $10,500 – 20,000 per year
3) $20,500 – 30,000 per year
4) $30,500 – 40,000 per year
5) $40,500 – 50,000 per year
6) $50,500 – 60,000 per year
7) $60,500 – 70,000 per year
8) $70,500 or more per year
9) Prefer not to say

21. What is your present employment status? ______________________

22. Do you do anything to make additional income in your home e.g. sewing, cooking, babysitting, etc.)?

1) No
2) Yes Specify: ______________________

23. Does anyone else in your household provide economically for your family?

1) No
2) Yes Specify: ______________________

**HEALTH AND TYPE 2 DIABETES:** *In these next few questions, I’d like to learn your opinions about your health and type 2 diabetes. Your thoughts about these issues are important to me, and there are no right or wrong answers.*

24. Does your family have a history of diabetes?

1) No
2) Yes Specify: ______________________
Appendix E: (Continued)

25. When were you diagnosed with type 2 diabetes (sugar)?
______________________________________________________________________

26. Where were you diagnosed with type 2 diabetes (sugar)?
______________________________________________________________________

27. Are you taking medication to treat type 2 diabetes (sugar)?
   1) No
   2) Yes Specify (ask to see medications if feasible):
______________________________________________________________________

28. Do you use any traditional/alternative remedies or treatments for type 2 diabetes (sugar)?
______________________________________________________________________

29. Do you have health insurance?
   1) No
   2) Yes Specify type: ______________________________________________________________________

30. Does your health insurance cover medications to treat type 2 diabetes (sugar)?
   1) No
   2) Yes Specify type: ______________________________________________________________________

31. Do you have to pay a co-pay or deductible for your health insurance?
   1) No
   2) Yes How much: _______________________________________________________________________

32. How frequently do you go to the physician for type 2 diabetes (sugar)?
______________________________________________________________________

33. What was the date of your last physician’s visit for type 2 diabetes (sugar)?
______________________________________________________________________

34. What did your physician say is the status of your type 2 diabetes(sugar) e.g. too high?
______________________________________________________________________
Appendix E: (Continued)

35. Have you been diagnosed with any other medical conditions e.g. hypertension, etc.? If so, which ones? What medications do you take for these conditions?
________________________________________________________________
________________________________________________________________
________________________________________________________________

36. Do you smoke?
1) No
2) Yes   How frequently: ________________________________

37. Do you drink alcohol?
1) No
2) Yes   How frequently: ________________________________

Please tell me your height and weight.

1) Height __________  2) Weight __________

Okay, these are all the questions that I have for you. Thank you very much for your time and help. Do you have any questions for me?

IF YES → (Address questions).

IF NO → OK. Thank you again for your time.
Appendix F: Semi-Structural Interview Protocol

TYPE 2 DIABETES BELIEFS, OPINIONS, KNOWLEDGE In these next few questions, I’d like to learn your opinions about type 2 diabetes (sugar), health issues, and your thoughts about how to prevent and catch type 2 diabetes (sugar) early. Your thoughts about these issues are important to me, and there are no right or wrong answers.

1. How did you react when you were diagnosed with type 2 diabetes? [Prompt: ask for specifics]

2. How did you changed your lifestyle to manage your type 2 diabetes? [Probe for specific diet changes, increased physical activity, testing blood with glucometer]

3. How do you cope emotionally with having sugar? [Prompt: talking to family member and friends]

4. What is the most difficult thing for you deal with as you live with type 2 diabetes?

Okay, these are all the questions that I have for you. Thank you very much for your time and help. Do you have any questions for me?

IF YES ➔ (Address questions).

IF NO ➔ OK. Thank you again for your time.
Appendix G: Revised Semi-Structural Interview Protocol

TYPE 2 DIABETES BELIEFS, OPINIONS, KNOWLEDGE  In these next few questions, I’d like to learn your opinions about type 2 diabetes (sugar), health issues, and your thoughts about how to prevent and catch type 2 diabetes (sugar) early. Your thoughts about these issues are important to me, and there are no right or wrong answers.

1. How did you react when you were diagnosed with type 2 diabetes? [Prompt: ask for specifics]

2. How did you change your lifestyle to manage your type 2 diabetes? [Probe for specific diet changes, and increased physical activity]

3. How often do you test your blood daily with a glucometer? [Probe for specifics: if she tests regularly, ask if she records the daily glucose levels. If she does not test or does not test regularly, ask why not]

4. Does your health insurance cover the cost of the strips? What happens when you run out of strips?

5. How do you cope emotionally with having sugar? [Prompt: talking to family member and friends]

6. What can you do better to improve the management of your diabetes?

7. What role does prayer play in the treatment of your diabetes?

8. What is the most difficult thing for you to deal with as you live with type 2 diabetes?

9. What Caribbean foods do you consider good to eat with your diabetes?

Okay, these are all the questions that I have for you. Thank you very much for your time and help. Do you have any questions for me?

IF YES → (Address questions).

IF NO → OK. Thank you again for your time.
Appendix H: Free List Questionnaire

1. What are all the different ways you know of that you can prevent type 2 diabetes (sugar)? (Suggested prompt to use as needed to build lists: Is there anything else you can think of?)

1. _____________________________________________________________
2. _____________________________________________________________
3. _____________________________________________________________
4. _____________________________________________________________
5. _____________________________________________________________
6. _____________________________________________________________
7. _____________________________________________________________
8. _____________________________________________________________
9. _____________________________________________________________
10. _____________________________________________________________

2. What do you think causes type 2 diabetes (sugar)? (Suggested prompt to use as needed to build lists: Is there anything else you can think of?)

1. _____________________________________________________________
2. _____________________________________________________________
3. _____________________________________________________________
4. _____________________________________________________________
5. _____________________________________________________________
6. _____________________________________________________________
7. _____________________________________________________________
8. _____________________________________________________________
9. _____________________________________________________________
10. _____________________________________________________________

3. What are the symptoms of type 2 diabetes (sugar)? (Suggested prompt to use as needed to build lists: Is there anything else you can think of?)

1. _____________________________________________________________
2. _____________________________________________________________
3. _____________________________________________________________
4. _____________________________________________________________
Appendix H: (Continued)

4. What are the complications of type 2 diabetes (sugar)? *(Suggested prompt to use as needed to build lists: Is there anything else you can think of?) 1._________

5. What are the treatments for type 2 diabetes (sugar)? *(Suggested prompt to use as needed to build lists: Is there anything else you can think of?) 1._________
Appendix I: Cultural Beliefs About Type 2 Diabetes Questionnaire

**TYPE 2 DIABETES BELIEFS, OPINIONS, KNOWLEDGE** In these next few questions, I’d like to learn your opinions about type 2 diabetes (sugar), health issues, and your thoughts about how to prevent and catch type 2 diabetes (sugar) early. Your thoughts about these issues are important to me, and there are no right or wrong answers.

**Type 2 Diabetes Prevention**

1. Can eating right prevent diabetes?  
   - Yes  
   - No
2. Will getting tested by the physician stop diabetes from occurring?  
   - Yes  
   - No
3. Is there any way to prevent diabetes?  
   - Yes  
   - No
4. If someone loses weight will that stop them from developing diabetes?  
   - Yes  
   - No
5. Does eating too many starches lead to diabetes?  
   - Yes  
   - No
6. Does exercising regularly prevent diabetes from occurring?  
   - Yes  
   - No
7. Do you think that living in the Caribbean can prevent someone from developing diabetes?  
   - Yes  
   - No

**Causes of Type 2 Diabetes**

8. Is a person who is careful about what they eat likely to develop diabetes?  
   - Yes  
   - No
9. Is diabetes hereditary?  
   - Yes  
   - No
10. Is a person who exercises regularly more likely to develop diabetes?  
    - Yes  
    - No
11. Does the pancreas not working cause diabetes?  
    - Yes  
    - No
12. Is diabetes caused being overweight or obese?  
    - Yes  
    - No
13. Is a person who does not eat a lot of sweets likely to develop diabetes?  
    - Yes  
    - No
14. Do people who have a good lifestyle develop diabetes?  
    - Yes  
    - No
15. Did living in the U.S. cause you develop diabetes?  
    - Yes  
    - No
16. Is someone with normal blood pressure likely to get diabetes?  
    - Yes  
    - No
17. Can having diabetes during pregnancy cause diabetes later on?  
    - Yes  
    - No
18. Do some medications cause you to develop diabetes?  
    - Yes  
    - No
Appendix I: (Continued)

19. Is frequent urination a symptom of diabetes? Yes  No

Symptoms of Type 2 Diabetes

21. When someone does not experience dizziness is this a sign of diabetes? Yes  No
22. Is sweating a lot a symptom of diabetes? Yes  No
23. Is the loss of weight a symptom of diabetes? Yes  No
24. Are people with diabetes not tired and full of energy? Yes  No
25. Are vaginal infections a symptom of diabetes? Yes  No
26. Is loss of appetite a sign of diabetes? Yes  No
27. Is fruity or sweet breath a sign of diabetes? Yes  No
28. Is being irritable an indication of diabetes? Yes  No
29. Are wounds that heal well and quickly a symptom of diabetes? Yes  No
30. When ants follow the urine should a person suspect that she has diabetes? Yes  No
31. Is numbness in the fingers and toes a symptom of diabetes? Yes  No
32. Is good eye sight a sign of diabetes? Yes  No

Complications of Type 2 Diabetes

33. Can diabetes lead to amputations of the lower leg and feet? Yes  No
34. Does diabetes cause the kidneys to function properly? Yes  No
35. Is diabetes linked with bad eye sight? Yes  No
36. Is diabetes associated with good heart function? Yes  No
37. Can diabetes cause someone to fall into a coma? Yes  No
38. Does diabetes cause good circulation? Yes  No
39. Is normal blood pressure a complication of diabetes? Yes  No
40. Can diabetes cause a heart attack? Yes  No
41. Does diabetes cause stomach problems? Yes  No
42. Can strokes occur because of diabetes? Yes  No
43. Does diabetes produce healthy gums? Yes  No
Appendix I: (Continued)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>44.</td>
<td>Does diabetes cause you to have healthy skin?</td>
<td>Yes</td>
</tr>
<tr>
<td>45.</td>
<td>Does diabetes cause cataracts to develop?</td>
<td>Yes</td>
</tr>
<tr>
<td>Treatment of Type 2 Diabetes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>46.</td>
<td>Is insulin used to treat diabetes?</td>
<td>Yes</td>
</tr>
<tr>
<td>47.</td>
<td>Is medication (tablets) used to treat diabetes?</td>
<td>Yes</td>
</tr>
<tr>
<td>48.</td>
<td>Does a diet low in starches and sugar make the diabetes worse?</td>
<td>Yes</td>
</tr>
<tr>
<td>49.</td>
<td>Does not exercising help you control diabetes?</td>
<td>Yes</td>
</tr>
<tr>
<td>50.</td>
<td>Does gaining weight help control diabetes?</td>
<td>Yes</td>
</tr>
<tr>
<td>51.</td>
<td>Do alternative medications like bush teas, aloe, celery, cucumbers, caraili, noni, bitter melon, cerasee and others herbs to help control diabetes?</td>
<td>Yes</td>
</tr>
<tr>
<td>52.</td>
<td>Does prayer help control diabetes?</td>
<td>Yes</td>
</tr>
<tr>
<td>53.</td>
<td>Does having a Caribbean diet with traditional food help control diabetes?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Okay, these are all the questions that I have for you. Thank you very much for your time and help. Do you have any questions for me?

IF YES → (Address questions).

IF NO → OK. Thank you again for your time.
About the Author

Chrystal A.S. Smith received a Master’s Degree in Public Health from the University of South Florida in 2003, a Master’s Degree in Applied Anthropology from the University of Maryland, College Park in 1998 and Bachelor’s Degree in Anthropology from Howard University in 1991. Ms. Smith has taught graduate-level quantitative method courses and introductory anthropology courses at the University of Maryland, College Park and the University of South Florida.

While in the Ph.D. program at the University of South Florida, Ms. Smith has been employed as a graduate research assistant at the Alliance for Applied Research in Education and Anthropology. During this time, she has been the project director of a National Science Foundation grant to evaluate a Center for Teaching Learning and a Spencer Foundation funded Academy for Educational Development awarded grant.