

AN ASSESSMENT OF THE RISK FACTORS FOR TYPE 2 DIABETES
OF WOMEN IN RURAL JAMAICA

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This is dedicated to my daughter, Jihan, for her love and support.

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ABSTRACT

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by Gearline Bryan

This dissertation examined the risk factors for Type 2 Diabetes of women in rural Jamaica compared to national and international trends. The risk factors were analyzed to identify any lifestyle, socioeconomic and cultural factors affecting quality health outcomes of women in Jamaica. A household survey, The Behavioral Risk Factor Surveillance System (BRFSS), completed by 890 women in Clarendon, Jamaica and surrounding areas, was used to assess their risk factors for Type 2 Diabetes. The relationship between variables, and the significance of differences, were analyzed using the Kruskal Wallis and Mann-Whitney U test. Non-parametric tests were used to explore the relationship of body mass index (BMI) and risk factors for diabetes.

It was found that women who did not participate in any physical activities had a significant increase in BMI compared to women who exercised; women with health insurance had a higher BMI, and Seventh Day Adventists had significantly lower BMI's compared to Protestants. More than half of the respondents were overweight. The prevalence of Type 2 Diabetes in rural Jamaica is complicated by the lack of adequate health insurance, the costs associated with healthcare, the lack of vigorous public awareness campaigns, as well as too few health practitioners, including dieticians and social workers who could meet the need of diabetic women in rural Jamaica.

We concluded that a comprehensive plan, targeting women for reducing their risk factors for diabetes, needs to be implemented. This involves early diagnoses, continuing education for health providers, community mobilization and partnerships with churches, schools, banks, pharmacies and other groups to promote diabetes awareness. These factors will influence knowledge, positive lifestyle changes, early detection, and reduce the financial impact on an economically strained economy in Jamaica.

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CHAPTER I

INTRODUCTION

Jamaica is the largest English-speaking Commonwealth Caribbean Island, and the third-largest island in the region. Its motto is, “Out of Many, One People.”

The island is comprised of people of English, African, East Indian, Palestinian and Chinese descents. The Jamaican population is predominantly black at 93.7 percent with 50 percent of the population having attained at least a secondary school education. The proportion of Jamaicans with a tertiary level education has increased since 2000, from 8 to 11.3 percent. Almost 60 percent of Jamaicans 15-74 years are employed, with 45 percent in full time paid employment (Wilks, R., Younger, N., Tulloch-Reid, M., McFarlane, S., & Francis, D. (2008).

Jamaica gained its independence from the United Kingdom in 1962. The Prime Minister, and members of the House of Representatives are democratically elected; however, members of the Senate are appointed. Administratively, the country is divided into 14 parishes – Clarendon, Hanover, Kingston, Manchester, Portland, Saint Andrew, Saint Ann, Saint Catherine, Saint Elizabeth, Saint James, Saint Mary, Saint Thomas, Trelawney, and Westmoreland. Jamaica covers an area of 10,991 kilometers and lies about 88 kilometers south of Miami and 145 kilometers south of Cuba. In 2002, the population was estimated at 2,624,695 persons, 49.3% males and 50.7% females (Lewis, M.E. 2005, National). Of the territory, 25% of it is used for farming. The country suffers from extensive deforestation; its coastal waters are polluted by industrial waste, sewage, and oil spills, and its coral reefs have been damaged. Kingston, the capital, has serious

vehicle emission air pollution. Jamaica's economic situation so is also marked by wide disparity (McKenzie, N.D.).

Clarendon, located in Middlesex County on the south of the island between the island's eastern and western ends, is where the questionnaire survey was administered. Clarendon is one of the most populous parishes on the island and has estimated population of 200,000 people. It is the third largest parish and is a wide plain, marked by several rivers. Bauxite mining and growing tobacco, cotton, pimento, ginger, livestock, bananas, coffee, and cocoa are popular among the locals (Jamaica: Wiki, 2011). May Pen, the capital, is the fastest growing rural town close to Kingston, with a population estimated at 60,000. May Pen is one of Jamaica's most important agriculture towns and is known for dairy and fish farming. The town has a courthouse, post office, banks, hardware stores, eateries, and pharmacies. (Wikipedia, 2011).

In the rural community of Clarendon Parish, families grow their own fruits and vegetables, and use tree woods on their properties to build their houses, furniture and cabinetry. For economical reasons, this wood is similarly used for roasting food. People in rural Jamaica are very resourceful and conscious of the environment.

Children 0-14 years accounted for 31% of the total population in 2000. In 1998, life expectancy at birth was estimated to be 75 years (73 for males and 77 for females). Approximately 86% of the population age 15 years and older is literate (Jamaica: General situation and trends: Socioeconomic, political, and demographic overview, 1998). The poverty severity index rose from 3.9 in 1989 to 4.4 in 1992. The 1994 Jamaica Survey of Living Conditions reported a 10.6% decrease in the mean (Jamaica: General situation and

trends: Socioeconomic, political, and demographic overview, 1998). A survey of the leading causes of death found chronic, non-communicable diseases to be significant (Lewis, M. E., 2005: Health).

Tourism is a great contributor to Jamaica's economy, and employs many of its residents. Hotel accommodations, transportation, meals, events, and souvenirs are part of these services, with tourism providing the most capital for the country, not bauxite production as previously thought. Jamaica's economy has been based on agriculture as the leading export.

The Ministry of Health (MOH) is the organization that provides quality health services, while also promoting healthy lifestyles through policy making, steering and regulatory groups. The Ministry, with its Regional Health Authorities (RHAs), and related agencies is responsible for health care delivery across the island (Ministry of Health (MOH): Mission/Vision Statement, 2010).

Healthcare services do not appear to be centralized across the Island, towards providing patient-centered care to people with diabetes in rural Jamaica. Patient care is ideally provided in a manner to support patients emotionally and physically, along with adequate patient education, and information.

Healthcare services, including primary, secondary, and tertiary care are administered through four regional health authorities: South East Regional Health Authority, North East Regional Health Authority, Western Regional Health Authority, and Southern Regional Health Authority.

The mission of the Ministry of Health results in better care, more efficient and effective health practices, and healthier patients on the island. Jamaica addressed health problems through health care promotions, research, and surveillance mechanisms. These strategies, however, are not reaching all of the people.

According to Dr. Cheryl Samuel's dissertation: "Health care services in Jamaica are a mix of Ministry of Health (MOH) programs, private for-profit facilities, and private non-profit organizations. Currently, MOH programs provide primary health services at low or no cost and are geographically distributed with relatively good access, although demand in some areas is not always met. User fees are charged for MOH secondary care services, with some exemptions available" (Samuel, 2005). Jamaica no longer has user fees, as patients can receive free services from regional hospitals and health centers. Still, demand for services is not always met.

The leading causes of mortality and morbidity are chronic non-communicable diseases, hypertension, and diabetes (123,090 and 50,783 visits, respectively), which constitutes two causes of ambulatory visits to health centers in 1996. In 1994, cardiovascular disease, mellitus, and neoplasm were among the top five causes of hospitalization. An island-wide survey in 1993 indicated that the prevalence of diabetes was 17.9% and that hypertension was 21.1% (Jamaica: General situation and trends: Socioeconomic, political, and demographic overview, 1998).

In Jamaica, there is evidence that diabetes has increased by 12% to 16%, which one-third of the reported cases are undiagnosed.

Women are traditionally over represented among the poor, and therefore have less access to both remuneration and health resources, which includes health insurance and social security services. Women are also disadvantaged according to some fundamental economic indicators, such as unemployment and access to resources. In 2007, for example, of 124,500 unemployed people in the labor force, 65.4% were women. Thus, women's health care has been compromised in terms of effectiveness, access, and efficiency, given their lack of control over resources. (Bourne & Rhule, 2009).

Women in rural Jamaica often lack income, adequate health insurance, as well as the ability to pay for private insurance. Therefore, those with chronic diseases are not receiving optimal health care.

Obesity and fat distribution are well-established risk factors for Type 2 Diabetes. Several simple anthropometric indices of body composition, such as (BMI), waist circumference, and waist-to-hip ratio (WHR), predict incidence of the disease. Obesity is one of the most important modifiable risk factors for diabetes. Trials of lifestyle modification have seen substantial reductions in the risk of diabetes in people with impaired glucose tolerance. Weight reduction is an important intervention (Sargeant, L.A. et al., 2002).

Diabetes and hypertension are generally co-factors in patients with lung and heart conditions, stroke symptoms, headaches, musculoskeletal pains, sleep apnea, work injuries, kidney failure, anxiety and depression. Weight reduction reduces the severity of hypertension and diabetes. Chronic diseases can often be reduced, and even eliminated, with weight loss (Lyons, 2010).

Patients with diabetes and hypertension should systematically be encouraged by their physicians to lose weight, follow medication regimens, and exercise regularly.

Physicians should also explain how weight impacts chronic disease.

The major cause of death and disability in Jamaica has changed from communicable and infectious diseases to chronic non-communicable disease conditions. The major health challenges are largely rooted in lifestyle and show a dominance of the three priority health areas, namely, chronic disease, sexually related conditions including HIV/AIDS, and violence related injuries and deaths. There is a high frequency of familial history of chronic disease in Jamaica.

Chronic, non-communicable diseases are now a major cause of death in most countries. A large portion of the population suffering from diabetes and hypertension, has a family history of these diseases. The average Jamaican's diet consists of carbohydrates and small portions of fruits and vegetables. More people eat fast foods, which are usually fried. Chronic disease care is costly throughout the world, and presents obstacles to adequate health care. Private insurance coverage and related benefits, provided under the National Health Fund program, remain low. Chronic diseases, including diabetes, are a major health threat to the Jamaican population. Approximately 150,000 Jamaicans, 15 to 74 years in age, have diabetes mellitus, and another quarter has hypertension problems. While males and females have a similar incidence of both hypertension and diabetes, females demonstrate significantly higher rates of obesity and high cholesterol. Half of those with hypertension were unaware of their condition, since it is known as the "silent killer," whereas three quarters of those with diabetes were aware of their problem. Obesity increases are associated with increased prevalence of

hypertension, diabetes mellitus, and high cholesterol in males and females. The prevalence of chronic diseases varied according to socioeconomic status, with more people at the lower level suffering from diabetes, hypertension, and depression (Wilks, Younger, Tulloch-Reid, McFarlane, & Francis, 2008).

Major obstacles toward the elimination of chronic disease are patients who do not comply with treatment regimens, as well as inadequate changes in lifestyle. It is necessary to increase prevention and education outreach of chronic diseases. It would help to strengthen relationships between the patient and healthcare providers.

This study is assessing the risk factors of Type 2 Diabetes of women in rural Jamaica and analyzing diabetes risk factors compared to national and international trends identified by the Centers for Disease Control and Prevention (CDC). Following is a summary discussion of the burden of diabetes, possible causes, and approach this study will pursue to identify the impact of risk factors.

Problem Statement

Chronic non-communicable disease, such as diabetes, is a burden to Jamaica and is increasing. Women are susceptible to being overweight or obese, have low levels of physical activity, have higher incidence of chronic non-communicable diseases, lack health insurance, and have limited knowledge of diabetes. Lifestyle habits and behaviors can be changed to promote better health for the entire family with the proper education and prevention strategies directed by healthcare practitioners. Referenced studies support a need to further study of Type 2 Diabetes among women in rural Jamaica.

The high prevalence or “disease burden,” preventability, the public perception of the risk from the disease, and the access to healthcare are a few of the challenges in managing this disease in Jamaica (Jamaica: Country profile, 1996).

Women in rural Jamaica tend to be overweight or obese and lifestyle behaviors do not include a high level of physical activity. Women in rural Jamaica are not receiving the message of the importance of lifestyle changes to obtain a better level of health security.

Dr. Cheryl Samuels (2005) stated in her study, “Contributing to the seriousness of the situation are: lack of early diagnosis; inadequate resources for biomedical healthcare; conflict of treatment modalities between biomedical and ethno medical practitioners; different perceptions by medical personnel and patients as to the cause, nature and treatment of Type 2 Diabetes; and severe patient/provider communication problems.” These problems still exist between health providers and their patients.

This research is designed to investigate the risk for Type 2 Diabetes of women in rural Jamaica. Research will be constructed by utilizing available literature reviews from scholars, University of the West Indies, Pan American Health Organization, Ministry of Health of Jamaica, World Health Organization, and the Centers for Disease Control and Prevention to gather specific information on Type 2 Diabetes and its impact on Jamaica.

A health promotion campaign on Type 2 Diabetes, targeting women in rural Jamaica will impact the health of families by decreasing the incidence of diabetes, other chronic diseases in the target population, and costs associated with treatment.

Research Questions

What are the risk factors associated with Type 2 Diabetes of women in rural Jamaica?

Is public awareness of Type 2 Diabetes provided to women in rural Jamaica?

CHAPTER II

LITERATURE REVIEW

Globally, chronic illnesses are the leading cause of mortality, and this is no different in developing countries, particularly in the Caribbean. This thorough review of literature supports the need both for assessing the risk factors of Type 2 Diabetes among women in rural Jamaica and for the analysis of diabetes risk factors compared with national and international trends. The literature review shows the relationship of diabetes with hypertension and cardiovascular disease. Lifestyle choices associated with Type 2 Diabetes among women are identified and discussed, as well as lifestyle choices – such as a healthy diet and exercise – that serve as an intervention or prevention of diabetes. Literature shows that diabetes disproportionately affect women, especially those in rural Jamaica. This chronic disease is impacting the financial conditions of countries worldwide. Some countries are implementing strong policies and practices to reduce the prevalence of diabetes and to meet the health-care needs of their people. This literature review identifies strategies to improve health-care delivery and the promotion of public awareness of diabetes targeting women in rural Jamaica. Literature was reviewed to examine health-care structure, policy, strategies, and the prevalence of diabetes of women in rural Jamaica.

Diabetes is a leading cause of mortality and a global health problem. A survey of living conditions in Jamaica sampled 592 participants from the 2002 and 2007 Jamaica Survey of Living Conditions reported 79% of all mortalities are caused by chronic diseases and diabetes mellitus is growing rapidly among its residents (Wild, Roglic,

Sicree, Green, and King, 2000). This study reports that diabetes mellitus has shown an exponential average annual increase of 185% compared with hypertension (+ 12.7%) and arthritis (- 3.8%). Almost 5% of diabetics were less than 30 years of age (2.4% less than 15 years), and 41% less than 59 years, the study shows.

According to Callender (2000), mellitus, or simply diabetes, is a group of metabolic diseases whose common feature is an elevated blood glucose level (hyperglycemia). Chronic hyperglycemia is associated with the long-term consequences of diabetes, including damage and dysfunction of the cardiovascular system, eyes, kidneys, and nerves. Complications of diabetes may be divided into two groups: micro vascular (retinopathy, nephropathy, and neuropathy) and macro vascular (ischemic heart disease, stroke, peripheral vascular disease).

Type 2 Diabetes, predominantly affects middle-aged and older people, but is increasing among children and young adults in countries because of increased obesity and other risk factors worldwide, although some of the increase may be due to improved diagnosis. Risk factors for Type 2 Diabetes include obesity, physical inactivity, aging and genetic predisposition (Callender, 2000). In addition, the association of diabetes with heart disease and high blood pressure is related to obesity in Jamaica and throughout the world. Callender (2000) notes the positive association between diabetic and hypertensive patients – 50% of individuals with diabetes have a history of hypertension, and the prevalence rate of diabetes mellitus affecting Jamaicans is noted to be higher than in North American and “many European countries” (Callender, 2000)

The situation is particularly worrying in the so-called developing countries where detection is poor and insulin, needed to treat most patients, is not always available.

Lifestyle changes appear to account for the increased rate of Type 2 Diabetes among younger generations. Lack of activity leads to an over-abundance of glucose in the body's cells and the insulin is not able to absorb at the same rate. Foods with high fat and cholesterol lead to health problems. A major factor is the promotion of eating habits that are high in fats and cholesterol, including convenience meals. Fast food outlets, such as McDonalds, Kentucky Fried Chicken, pizza, fried potato chips and hamburgers, provide a quick alternative to preparing healthy food (Josling, 2001). In rural Jamaica, vendors sell unhealthy foods and snacks at the school gates. Youth need intervention and prevention programs at home and at school. Positive messages need to be directed to youth about the importance of exercising and eating healthy. Healthy eating should be promoted by health-care professionals, schools, churches, and through media outlets of developing countries to reach the target population.

The American Heart Association estimates that heart disease and stroke are responsible for two-thirds to three-fourths of the deaths amongst those with diabetes (Vakkilainen, 2003). The Framingham Study also represents valuable results connecting diabetes to heart disease and other health problems, and was one of the first studies to show this connection. The Framingham Study looked at generations of people, including those with diabetes, to try to determine the health risk factors for developing heart disease. It showed that multiple health factors – including diabetes – could increase the possibility of developing heart disease and supported the premise of diastolic blood pressure in diabetic patients being related to an increase of cardiovascular risk. This is a critical indicator in the prevention of critical health events in diabetic patients. (Otvos, 2003).

Income is positively correlated with health because money does make a difference in being able to afford health care, a healthy diet, and a safe place to live. Also, a healthy lifestyle can protect individuals from chronic disease. But as Bourne et al., (2010, May) point out, when individuals choose unhealthy lifestyles money can do little to eradicate the onset of diabetes, hypertension, heart disease, or other chronic diseases. Money enhances the ability of obtaining better health, but it cannot buy good health, which is not transferable from one to another.

The message of the definition of diabetes and what can be done to control and prevent Type 2 Diabetes must be delivered to community members in rural and urban areas. Medication may be needed with the progression of the disease. As the disease progresses, it damages vital body organs and it can cause heart disease. Treatment and medication for chronic disease, such as, diabetes is costly to the patient and provides a burden to the country.

In addition, health-care practitioners must teach their patients about healthy weight maintenance and to calculate Body Mass Index (BMI). Female patients are categorized as underweight, overweight, obese, or extremely obese based on BMI (normal BMI is 18.5 to 24.9). The higher the BMI, the more likely the patient will need medications for multiple conditions, but the most effective treatment is weight reduction (Lyons, 2010).

The growing problem of obesity calls for greater education and support for weight loss as a means to prevent or delay Type 2 Diabetes, especially among at-risk groups. According to the National Health and Nutrition Examination (NHANES) 2007-2008, race and ethnicity are indicators of obesity and being overweight (U.S. Department of

Health and Human Services, National Institutes of Health, 2010), although the problem affects all ages, both genders, and all racial and ethnic groups. Obesity has been growing for the last 30 years, and according to the NHANES report, about one-third of adults in the United States are overweight. Among women, overweight and obesity are highest for non-Hispanic African American women (about 78%), compared with about 76% for Hispanic women and 61% for non-Hispanic White women. Among men, overweight and obesity also are higher for minority groups, and are highest for Hispanic men (about 79%), compared with about 73% for non-Hispanic White men and about 69% for non-Hispanic African American men. According to NHANES, about one in six American children ages 2 – 19 is obese. The survey also suggests that overweight and obesity are having a greater effect on minority groups, including African- Americans and Hispanics (U.S. Department of Health and Human Services, National Institutes of Health, 2010).

A diagnosis of *metabolic syndrome* (or a group of risk factors associated with risk of heart disease and diabetes) is to prevent other chronic health problems, such as diabetes. A diagnosis of metabolic syndrome is made if at least three of the following risk factors are present: a large waistline (or “having an apple shape”); a higher than normal triglyceride level a lower than normal HDL cholesterol level; higher than normal blood pressure; and higher than normal fasting blood sugar (U.S. Department of Human Services, National Heart Lung and Blood Institute, 2010). Metabolic syndrome may be a stronger predictor for risk of diabetes among women than men, according to Ford et al. (2008).

In addition to metabolic syndrome, health surveys can be useful in predicting risk for diabetes and other chronic diseases and for planning intervention and prevention efforts.

One such survey is the Behavioral Risk Factor Surveillance System (BRFSS), a telephone survey administered by the Centers for Disease Control and Prevention through state health departments. The survey is conducted in all 50 states and in the District of Columbia, Guam, Puerto Rico, and the U.S. Virgin Islands (National Diabetes Fact Sheet, 2005). The survey was modified to meet the needs of this study and was used in face-to-face interviews. This ongoing data collection program measured the adult population's (18 years of age and above) behavioral risk factors among Jamaican women.

The American Diabetes Association's (ADA) revision of diabetes diagnosis using the no fasting blood sample test (A1C) should prove instrumental in identifying pre-diabetes and preventing diabetes complications (Malik et al., 2010), but the A1C test is not available for Jamaicans who receive health-care services from government hospitals and health centers. The revised ADA practice is recommended because it is a faster, easier diagnostic test, which, the association says, could reduce the number of patients who may be undiagnosed. The test could also help prevent complications of diabetes such as nephropathy, neuropathy, retinopathy, and gum disease because it is more precise (Malik et al., 2010).

Obesity, population aging, and physical inactivity are increasing diabetes among all age groups but the prevalence is greater among the aging population (Wild et al., 2000). Their research states the following occurrence of diabetes among the population: Type 1 diabetes, (insulin dependent) is more associated with childhood or teen years but can occur at any age. Type 2 Diabetes is more common and appears often after the age of 40 and affects a larger percentage of the population than type 1. A third type of diabetes, called gestational diabetes mellitus develops during pregnancy. According to

Wild (2000), it is estimated that the prevalence of diabetes for all age groups worldwide may be 2.8% in 2000 and 4.4% in 2030. The total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030. The prevalence of diabetes is higher in men than women, but there are more women with diabetes than men. The urban population in developing countries is projected to double between 2000 and 2030. The most demographic change to diabetes prevalence across the world appears to be the increase in the proportion of people 65 years of age and older (Wild et al., 2000). Collaborative patient management of the disease should result in better choices in controlling diabetes through communication and better patient behaviors.

My research focuses on risks factors of women with Type 2 Diabetes in rural Jamaica. The overall goals are to improve approaches and practices through better policies and guidelines targeting diabetes among women in rural Jamaica. The research questions “What are the risk factors associated with Type 2 Diabetes of women in rural Jamaica, and has public awareness been provided to make women in rural Jamaica aware of risks associated with diabetes?”

The Global Challenge

To put this study in context requires a look at statistical information, studies, and articles concerning the affects of diabetes on a global level. Data was collected and reviewed on Britain, Japan, China, Canada, United States, the Caribbean, and Jamaica to make a comparison of policies and practices and to discern strategies in other countries that may be duplicated.

Diabetes Action Now indicates that the world is facing a growing diabetes epidemic of potentially devastating proportions, which will be felt most severely in developing countries. The numbers of people with diabetes will more than double over the next 25 years, to reach a total of 366 million by 2030. Most of this increase will occur as a result of a 150% rise in developing countries. The top 10 countries with the most people with diabetes are India, China, the United States, Indonesia, Japan, Pakistan, Russia, Brazil, Italy, and Bangladesh (Diabetes Action Now, 2003). The countries with the highest prevalence rates are Nauru, United Arab Emirates, Saudi Arabia, Bahrain and Kuwait (Diabetes, 2010). Although a larger percentage of the increase of diabetes will occur in developing countries; all countries will realize a level of increase of the disease.

Mellitus is a chronic metabolic disease characterized by hyperglycemia and by disturbances of carbohydrate, fat, and protein metabolism. It is associated with an absolute or relative deficiency in the secretion and/or action of the hormone insulin. Whereas currently, 52% of these people from the Americas are living in Latin America and the Caribbean, by 2025 the number will have reached 62%, representing 40 million persons. (Barceló & Rajpathak, 2001).

Lifestyle changes of eating meals high in calories and not exercising have increased premature deaths and complications from diseases such as diabetes and cardiovascular diseases. These lifestyle changes are greatly affecting Latin America and the Caribbean.

Unwin, (2004, June) stated in the article Diabetes Action Now, that a joint initiative of the World Health Organization (WHO) and the International Diabetes Federation (IDF), is one of several initiatives that these organizations are undertaking,

globally, regionally, and within countries with the overall goal of reducing the impact of diabetes and related chronic conditions upon people's health worldwide. Funding for Diabetes Action Now also comes from a World Diabetes Foundation grant. The program focuses on low- and middle-income communities, particularly in developing countries. The overall purpose of Diabetes Action Now is to stimulate and support the adoption of effective measures for the surveillance, prevention and control of diabetes. A key aim of the program is to achieve a substantial increase in global awareness about diabetes and its complications. Cardiovascular disease is responsible for between 50% and 80% of deaths in people with diabetes (Diabetes Action Now, 2010). Diabetes can cause complications like amputation, kidney failure, and blindness, as well as social and financial burdens. More people die prematurely from diabetes in developing countries.

World Diabetes Day is the primary awareness campaign of the diabetes world. The IDF and WHO introduced World Diabetes Day in 1991 in response to concern over the escalating incidence of diabetes around the world. The date of November 14 was chosen because it is the birthday of Frederick Banting who, along with Charles Best, first conceived the idea that led to the discovery of insulin in 1921. While many events take place on or around the day itself, themed campaigning is spread over the whole year in an effort to inform the public of the causes, symptoms, complications and treatment associated with the condition. According to the Diabetes Atlas (2006), more than 195 associations of the International Diabetes Federation, as well as other associations and organizations, health-care professionals, people with diabetes and their families in more than 155 countries, celebrate World Diabetes Day.

According to Diabetes Atlas (2006), the human and social effects of diabetes are felt throughout the world. India has the largest diabetes population in the world with an estimated 41 million people, amounting to 6% of the adult population. In China, where 4.3% of the population is affected by diabetes, the number of people with this condition is expected to exceed 50 million with the next 20 years. The prevalence of Type 2 Diabetes in Japan among junior high school children has doubled from 7.3 per 100,000 in 1976-80 to 13.9 per 100,000 in 1991-95, with Type 2 Diabetes now outnumbering Type 1 Diabetes in that country. In many countries in Asia, the Middle East, Oceania and the Caribbean, diabetes affects 12% to 20% of the adult population.

Sub-Saharan Africa mortality from diabetes is four times higher than the world average. In Zambia, which has a program for insulin management, a person requiring insulin for survival can expect to live an average of 11 years. In Mali, the same person can expect to live for only 30 months, while in Mozambique that person will be dead within a year (Diabetes Atlas, 2006). Diabetes is affecting the mortality of people worldwide. The prevalence of diabetes is increasing among children and adults, and in some countries, diabetes is a death sentence.

The CODE-2 Study (Costs of Diabetes in Europe-Type 2) shows that controlling Type 2 Diabetes will reduce the economic impact of the disease by reducing complications of this devastating disease. According to Wochenschr (2001), in the CODE-2 Study, which was performed in eight countries, the total expenses for type 2 diabetics in Germany were evaluated and analyzed for the first time. In Germany, medical, demographic, and economic data of 809 patients were obtained retrospectively for a one-year period, using face-to-face interviews with 135 physicians. The annual costs of Type 2 Diabetes patients in

Germany in 1998 amounted to 31.4 billion DM. The majority of these costs (61%) were covered by statutory and private health insurance. The annual expenses of the Statutory Health Insurance (SHI) for these patients amounted to 18.5 billion DM. The costs per patient, compared to the average expenses for SHI insured patients, increased with complication state from the 1.3-fold (no complications) up to 4.1-fold (macro- and micro-vascular complications). The overall costs for patients with Type 2 Diabetes were higher than expected from previous estimates. Diabetes related complications and concomitant diseases are the predominant reasons for these high costs. Control of blood glucose is inadequate for the majority of diabetic patients. To prevent long-term complications, an optimized treatment of Type 2 Diabetes is imperative not only from a medical perspective, but also from a health economics point of view (Wochenschr, 2001).

Frese (2008) reports on another German study that shows how diabetes challenges the nation's health-care system, causing a greater prevalence in consultation hours for physicians. In this study, the *Sachsische epidemiologische Studien in der Allgemeinmedizin* (SESAM) were used to estimate the occurrence of diabetes in the German state of Saxony. Two hundred and seventy of 2,510 (10.8%) solicited physicians participated. Cross-sectional data was collected from 1 October 1999 until 30 September 2000, from randomly selected patients previously known to the practitioner. The researchers found that diabetes was prevalent in 14% (n=1,241) of the patients and the incidence was 0.3% (27 of 8,877 cases). Related to the German population in general, the prevalence ranged from 7.9 to 9.2%. The estimated consultation prevalence is about four times higher than that in other European countries, indicating that diabetes is a major challenge (Frese, 2008).

In 2003, Germany implemented a disease management program (DMP) for Type 2 Diabetes, according to Schafer et al. (2010). Both patients and physicians participated voluntarily within the statutory health insurance. Sixty-four percent (64%) of insured patients with Type 2 Diabetes were enrolled. The outcome was that patients with Type 2 Diabetes thought the DMP improved their care over a year's time (Schafer et al., 2010) and researchers recommended continuation of the program.

According to Meisinger (2008), blood pressure and risk of Type 2 Diabetes in men and women in a representative population sample in Germany established that hypertension was significantly associated with Type 2 Diabetes in both genders. High normal blood pressure significantly increased the risk of diabetes among men only. Meisinger also reports that "higher blood pressure levels were associated with older age, higher body mass index (BMI), a higher prevalence of dyslipidemia, a lower prevalence of regular smoking, high alcohol consumption (men only), and a lower education level."

This study agrees with other studies conducted in Japan that supports the premise of obesity as a risk factor is greater in middle-aged adults than older adults. For example, in Sasai et al. (2010), a cohort of Japanese men (N=19,926) and women (N=41,489) between the ages of 40 and 79 were studied from 1993 through 2006, and the effect of obesity on the risk of diabetes was greater for middle-aged than for older adults. Similar to other parts of the world, diabetes is on the rise in Japan. According to the Diabetes Fact Book (2008):

"A 2008 report stated that there are approximately 8.2 million Japanese who are strongly suspected of having diabetes. Also, the number of 'people who are strongly suspected to have diabetes' and 'people who possibly have diabetes' has

increased by 5 million during the period of almost 10 years from 1997 to 2006. Among all people who are strongly suspected to have diabetes, only 50.6% are currently being treated. In 2006, the cost of treating diabetes was 5.7-fold higher than 1979. Medical costs include the direct cost of hospitalization and outpatient treatment, as well as indirect costs such as transportation to clinics or provision of nursing care. Over the whole of Japan, these costs amount to 2.01 trillion yen and 1.35 trillion yen respectively.”

Nutrition and dietary habits are related to the quality of life and lifestyle related diseases. Exercise and physical activity prevent lifestyle related diseases and should be used to raise public awareness. The same protocol of changing lifestyle habits and nutrition are being recommended worldwide. The Asia Pacific Journal of Clinical Nutrition (2007), states, “Physical activities and exercise effectively prevent lifestyle-related diseases and are an important factor in health promotion, and therefore it is necessary to implement measures such as raising public awareness on physical activities and exercise. The number of diabetes patients in Japan is increasing as a result of the changes in people’s lifestyles and social environments.” Practicing a healthy lifestyle of exercise and diet can impact the prevalence of diabetes and the cost associated with the treatment of diabetes. A healthy lifestyle can impact the incidence of premature illness and death among diabetic patients. According to Diabetes Action Now (2010), “just 30 minutes of moderate exercise a day, five days a week, is enough to promote good health and reduce the chances of developing Type 2 Diabetes.”

The incidence of diabetes is spreading worldwide. Diabetes is an important public health problem that is preventable. A clear understanding must be communicated

of the relationship of obesity and inactivity with diabetes to patients. Dash, Kumar, and Agauwal (2009) wrote that diabetes may affect 1 in 20 adults worldwide and that onset of the disease is occurring at an earlier age. Because many people may have the disease for a decade before it is diagnosed, primary prevention is a cost effective approach to diabetes' associated risks (Dash, Kumar, & Agauwal, 2009).

Diabetes in the United States of America

Diabetes has affected a large percentage of families in the United States, afflicted individuals with disability, loss of work, and loss of life. Women and African-Americans are most affected by the chronic disease. The direct medical and indirect costs associated with the disease have escalated. According to the Centers for Disease Control's and Prevention, diabetes affects an estimated 21 million people in the United States and more than six million of these people are unaware that they have the disease. The National Institute of Diabetes and Digestive, 20 Kidney Diseases (NIDDK), and the American Diabetes Association, report that those affected include:

9.3 million women (8.7% of all women),

8.7 million men (8.7% of all men),

206,000 people under age 20,

8.6 million adults over age 60,

2.7 million African Americans (11.4% of all African-Americans),

2 million Hispanic/Latino Americans (8.2% of all Hispanic/ Latino Americans), and

12.5 million Caucasian Americans (8.2% of all Caucasian Americans).

Diabetes is the sixth leading cause of death and the fifth leading cause of death from disease, and the impact of the disease amounts to \$92 billion per year in direct medical costs and another \$40 billion per year in indirect costs, such as loss of work, disability and loss of life (Diabetes, 2010). Despite these numbers, many Americans may not know they have diabetes. A national survey of adults in the United States revealed that less than 10% of adults with pre-diabetes know they are at high risk for developing diabetes (Geiss, 2010). Identification is important so that lifestyle changes such as dietary changes, weight loss and increased physical activity can be implemented to reduce risk. According to Geiss (2010), physicians are not promoting awareness among diabetic patients because of lack of reimbursement for preventive services, lack of time, improper physician training, or just lack of successful strategies of preventive programs.

The 40 Steps communities, addressing chronic diseases and conditions during 2006-2007, conducted a survey on adult health outcomes using the Behavioral Risk Factor Surveillance System (BRFSS, 2005) to collect information on chronic diseases, conditions, health risk behaviors and preventive health policies. The findings recommended a continuing need to evaluate prevention and interventions at the community level and implement policies to promote healthy behaviors. (Cory et al., 2010).

Type 2 Diabetes accounts for almost 95% of all cases of diabetes. The disease is associated with other chronic diseases and conditions related to age, family history, and obesity. Type 2 Diabetes is being diagnosed more frequently in children, African-Americans, Hispanic/Latino Americans, American Indians, Asian Americans, Native Hawaiians and other Pacific Islanders. (National Diabetes Fact Sheet, 2005). People of

color have a greater burden of diabetes than white populations (Diabetes Disparities among Racial and Ethnic Minorities, 2001). African Americans, Mexican Americans, American Indians, Japanese Americans, Chinese Americans, Filipino Americans and Korean Americans have higher prevalence of the disease than whites. Even diabetes-related kidney failure affects a higher percentage of African-Americans than whites. African-Americans also have a higher incidence of hypertension than whites. More African-Americans have hypertension and diabetes, and it is possible that there is a disparity in medical care of African-American patients with Type 2 Diabetes (Diabetes Disparities among Racial and Ethnic Minorities, 2001). According to the Rural Healthy People 2010 survey, diabetes was identified as the third highest ranking rural health concern after heart disease and stroke, and socioeconomic, racial/ethnic, lifestyle factors, and age are factors in the rural populations being affected (Dabney and Gosschalk, 2010). Community partnerships and public awareness campaigns may be a way to reach at-risk populations, according to Dr. James R. Gavin, III, Chair of NDEP and President of Morehouse School of Medicine (National Diabetes Education Program, 2004).

Diabetes is at epidemic proportion in the United States (23.6 million people). Type 2 Diabetes accounts for 90% of cases and Type 1 accounts for 10% of diabetes in children and young adults. Diabetes leads as a cause of blindness in adults. (Skarbez, Priestley, Hoepf, & Koevary, 2010).

In addition, other surveys have concluded that skin diseases and infections are very common in patients with diabetes (Sasmaz, Buyukbese, Cetinkaya, Celik, and Arican, 2005), and referrals to a dermatologist or other therapy may be needed.

Patients with Type 2 Diabetes must understand insulin therapy to manage the disease and prevent complications, according to Cooppan (2007). Grunberger (2009) states that “comprehensive interventions targeted at glycemic control are essential for the long-term health of patients (with Type 2 Diabetes) at lower cost. Strategies to enhance healthcare services include identifying and overcoming barriers, and using a team approach in which every member of the team has a heightened awareness of the benefits of tight glycemic control and the way in which this can be achieved.” The importance of this type of team approach was reinforced in a Swedish study concerning the interaction between Type 2 Diabetes patients and diabetes nurse specialist using video recordings during annual check-ups (Edwall, Danielson, and Smith, 2010). This study revealed a more efficient way of reflecting clinical goals and sharing treatment options with the patients. Patients and nurses gained a better knowledge of maintaining health and diabetes control.

Healthcare professionals may encounter certain barriers to insulin therapy. Physicians may be concerned about side effects such as weight gain and hypoglycemia. In addition, many physicians have limited time for patient education regarding insulin administration techniques. Some patients may be concerned about the discomfort of the injections, the belief that insulin therapy means the condition has advanced, and the complexity of the regimens. Attending physicians can address these concerns to help the patient gain a better understanding of insulin therapy (Campos, 2007).

Being overweight and obese is an invitation of chronic diseases, such as diabetes. Overweight and obesity is the result of a lack of energy balance. Energy *in* should equal energy *out*. Energy is obtained from what a person eats and drinks, and is expended as

the body uses energy to function – breathing, digesting, and physical activity. The balance of energy in and out maintains a healthy weight. A sedentary lifestyle without a balance between diet and exercise, carries an increase of risk of chronic diseases (coronary heart disease, high blood pressure, diabetes, colon cancer) and other health problems, according to the U.S. Department of Health and Human Services: National Heart, Lung, and Blood Institute (2010).

According to the Centers for Disease Control and Prevention (CDC), diabetes and its complications are very costly. The Amputee Coalition of America states, “Diabetes-related amputations cost approximately \$3 billion per year” (2007, page 2). Lower extremity amputations and ulcerations represent a major cause of morbidity and contribute to cardiovascular mortality of patients with diabetes. As a result, an increased economical burden has been placed on the American society. Routine foot assessments and patient education may prevent more than half of amputations related to diabetes (Sanchez, 2009).

Family history of diabetes can be important for screening and prevention. A study compared pregnant Jamaican women who had a family history of early onset autosomal dominant Type 2 Diabetes with those who had no history of the disease. The study found that the incidence of gestational diabetes mellitus in women with a family history of early onset autosomal dominant Type 2 Diabetes was 12% but only 1.5% in women without a family history. The study’s conclusion was that family history appears to increase susceptibility to gestational diabetes mellitus in Jamaican women, and that all pregnant women with a family history should be screened for gestational diabetes mellitus (Irving et al., 2008).

Skin diseases are common among diabetic patients. Studies conducted in Pakistan and Italy indicated a high prevalence of skin disorders of diabetic patients, and primary healthcare providers are advised to use aggressive management and to make necessary referrals to dermatologist or other required therapy. According to Sasmaz, proper skin care and long-term control of blood glucose levels may reduce the risk of some of the skin disorders in diabetic subjects (Sasmaz et al., 2005).

Sugar-laden beverages, common in the United States, have been linked to weight gain and diabetes. A study was conducted from 1991-1999 of women to examine the relationship between the consumption of sugar-sweetened beverages and weight change and risk of Type 2 Diabetes in women (Schulze et al., 2004). These women were in the Nurses' Health Study II program, which identified 741 incident cases of confirmed Type 2 Diabetes during 716,300 person-years of follow-up. The major outcome measures were the incidence of Type 2 Diabetes and weight gain. Weight among women was the highest during a four-year period of women who increased consumption of sugar-sweetened soft drinks and lowest among women who decreased the consumption of sugar-sweetened soft drinks. The consumption of fruit punch was also associated with diabetes risk. The conclusion was the consumption of sugar-sweetened drinks is associated with an increased risk of developing Type 2 Diabetes in women. Wood (2010) reports a similar outcome in an analysis of 11 studies looking a metabolic syndrome or diabetes as it relates to sugar-sweetened-beverage consumption, and Malik et al. (2010) show that consumption of one to two sugar-sweetened beverages a day is associated with a 26% greater risk of developing Type 2 Diabetes with a 20% increased risk of having metabolic syndrome.

Similarly, consuming processed meat (a common food in the U.S.) has also been linked to risk for coronary heart disease and diabetes because processed meat contains more sodium, fat, and preservatives. Nainggolan (2010) cites findings by Dr. Renata Micha and colleagues at the Harvard School of Public Health that indicate eating 50 grams of processed meat per day (one typical hot dog or two slices of deli meat) is associated with a 42% higher risk of heart disease and a 19% increased risk of diabetes.

Ethnicity influences food habits in the United States and are likely to influence the prevalence of diabetes. Takeout and fast food restaurants offer a wide-range of foods to select from to include tacos, egg rolls and pizza. Because diabetes is steadily growing in high-risk populations such as African-Americans, Latinos, Native Americans and Asian Americans who may consume more of these food choices, Kulkarni (n.d.) suggests that nutrition educators should address traditional health beliefs and dietary customs.

Surprising as it may be in a developed country like the United States, 14% of the population is considered food insecure or at risk of being hungry because of not being able to afford food, according to a study published in the *Journal of Health Care for the Poor* (Seligman, Davis, Schillinger, & Wolf, 2010). Food insecurity is of particular concern to those with diabetes who are subject to hypoglycemia and may not have sufficient food to manage their diabetes.

As obesity and overweight increase in America, especially among Hispanics, African-Americans, and the undereducated, community action is needed. Adults and children need to be encouraged to eat healthy and to exercise, and First Lady Michelle Obama is a strong crusader of children eating healthy and exercising (Diet and Weight Loss, 2010).

Public campaigns urging Americans to become more active and to exercise are a way to prevent diabetes. Among the many reasons Americans may not be as active as they could be include reliance on cars instead of walking, fewer physical demands at work or at home because of modern technology and conveniences, and lack of physical education classes in schools for children. People who are inactive are more likely to gain weight because they don't burn up the calories that they take in from food and drinks. An inactive lifestyle also increases risk of coronary heart disease, high blood pressure, diabetes, colon cancer, and other health problems (U.S. Department of Health and Human Services: NHLBI, 2010).

The American Diabetes Association and the American College of Sports Medicine have set guidelines to emphasize the role of physical activity in Type 2 Diabetes management. The new guidelines recommend 150 minutes per week of exercise and include considerations for those whose diabetes may limit their ability to exercise (Lowry, F., 2010).

Diabetes in the United Kingdom

The death rate in the United Kingdom, which is higher than in the United States, is largely linked to heart disease and the aging population (Lopes, Coppola, and Riste, 2010). The population is almost completely literate and the ethnicity is 95% British or Irish descent. England has the largest population of all the countries of the United Kingdom. The United Kingdom's obesity level is 22% and overweight is 75% and both are increasing (Obesity: Weighty Matters, 2010). Obesity is responsible for premature deaths in the United Kingdom. The United Kingdom is promoting healthier lifestyles by

teaching children to eat healthier in schools and has called for a ban on junk food advertisement to children. The Public Health Committee of the British Medical Association has already called for a ban on 'junk food' advertising to children.

Research in Britain on diabetes has targeted population groups with West African origins. A study by Cruickshank et al. (2001) on the nutritional influences on high blood pressure and glucose intolerance compared rural and urban Cameroon, and Jamaica and Caribbean migrants to Britain. An association of blood pressure and venous plasma glucose with obesity was shown (Cruickshank, Mbanya, Wilks, Balkau, McFarlane-Anderson, & Forrester, 2001). Their study of the potential nutritional influences on emerging high blood pressure and glucose intolerance was referenced in Dr. Cheryl Samuel's dissertation, "An Assessment of the Risk Factors for Type 2 Diabetes in Rural Jamaica" (Samuel, 2005).

Diabetes in Canada

Canada is geographically the second largest nation in the world and the largest on the North American continent, covering 9.9 million square kilometers (3.8 million square miles). In metropolitan areas, the population concentration is 245 persons per kilometer, or roughly comparable with that of England. As of October 1, 2007, Canada's population slightly exceeded 33 million people. Aboriginal peoples, persons who are of Inuit, Métis, or First Nation heritage, represented 3.8% of the population in 2006. Data from the 2006 census indicate that 6 of 10 Canadians had some level of education beyond secondary schooling (Johnson, & Stoskopf, 2009). Canadian's lifestyles present risk factors for Type 2 Diabetes.

Diabetes among Canadians, is the largest growing chronic disease behind hypertension and depression and is increasing as the population ages (Diabetes in Canada, 2002). As in other developed nations, unhealthy diet and lack of exercise are linked to a rise in obesity and overweight in all age groups. Canadians are living longer but some are living with functional limitations because of disease and disability. The prevalence of chronic diseases such as diabetes has almost doubled within the last ten years Diabetes in Canada (2002).

Aboriginal populations are also at risk for diabetes. The Métis are a diverse population who display wide variation in lifestyles and Aboriginal Canadian ancestry, both of which are risk factors for Type 2 Diabetes (Bruce, Kliewer, Young, Mayer, & Wajda, 2003). The Métis has a higher prevalence of diabetes than in Canadians nationally. While the majority of self-identified Métis live in urban areas, 35% reside in rural areas, compared to 15% of the non-Aboriginal Canadian population and 48% of First Nations people. Women are receiving a positive impact because of income and education. The Aboriginal Canadians' prevalence of diabetes is several times the Canadian average. Other chronic diseases are higher among Aboriginal Canadians. The health gaps may be indications of intervention and prevention tactics needing to be sensitive to all groups of people.

In Canada, cardiovascular disease accounted for a larger percentage of deaths among women and hypertension was more prevalent among women. Diabetes is slightly more prevalent among women and among the aging population (Duncan, Morris, & McCarey, 2010).

The findings of the 2003 Progress Report show regional disparities in access to and cost of diabetes medication (Canadian Diabetes Association, 2003). Most provincial and territorial drug benefit plans cover only some of the costs for diabetes supplies, medication and devices, according to the report. Significant disparities exist across the nine provinces (Canadian Diabetes Association, n.d.).

Diabetes in China

The increase in China's economic growth has affected its public health status by changed diets and more sedentary lifestyles. Diabetes in China has increased and is a major factor in other health conditions. Death from diabetes is increasing significantly.

A study was conducted in China, June 2007-May 2008, to determine the prevalence of diabetes among adults (Yang et al., 2010). A representative sample was conducted of 46,239 adults, older than 20 years. Yang et al., report results indicating diabetes has become a major health problem and that prevention and treatment strategies are needed.

China's incidence of diabetes is increasing and so is the financial burden of the disease. According to Pan (2005), China had a diabetes population of 23.8 million in 2003. "The health-care and financial costs of the rise in the number of people with diabetes complications are compounded by the psycho-social burden to people with the condition that requires around-the-clock self-care to optimize daily and long-term health outcomes and quality of life," Pan's study reports. Pan found that rural areas of China are especially affected by reduced access to medical care as the country has moved to a

fee-for-service system. Drawing upon the Diabcare-China 2003 study, which collected data from a cohort of around 2,700 people with diabetes at 30 specialist centers across China, Pan reports that 97% of those in the study had Type 2 Diabetes (Pan, 2005).

Pan, Shang, Kirch and Thoenes (2010) link the increase in diabetes in China to dietary and sedentary lifestyle changes. Although China has national education programs on diabetes, they state the need for further strategies on prevention and awareness to reduce the long-term complications and economic burden of diabetes.

According to Diabetes Voice (2005) Chinese people today are eating more and exercising less. Huge numbers of people in China, who previously walked or cycled, now drive cars or ride motorcycles; nowadays there are more high-calorie, high-fat, processed foods on dining tables in China. Such factors have triggered a rapid increase in the prevalence of obesity-driven diabetes in the country. It was estimated that the diabetes prevalence in rural areas was around half that of urban areas. Data from the Annual Statistical Reports of Death, Injuries and Causes of Death 2002 revealed a three-fold increase in the mortality rate per 100,000 people – from 5.1 per 100,000, 20 years ago, to 15.4 five years ago. The American Association of Clinical Endocrinologists has declared that, optimal diabetes care must also include proper nutrition, weight control, physical activity programs and smoking cessation. The low diabetes awareness among the general public is compounded by misunderstandings around various aspects of diabetes care, such as the use of insulin. Between 1997 and 2004, 490 lectures were held at the People's Liberation Army (PLA) General Hospital in Beijing, offering diabetes education to over 15,000 people with the condition. The objective of these events is to encourage a greater degree of self-care for people with diabetes and thus reduce disabling

complications. However, there is growing recognition from the Chinese government of the need to adopt best-practice medical management, including the provision of diabetes self-care education and the promotion of healthy lifestyle choices (Diabetes Voice, 2005).

Economic development has an impact on the diabetes rate in China. The rising economy of China has had a negative impact on the quality of life. More Chinese people can afford to drive and to eat out. As a result, more people are dying from diabetes. China's population needs health promotion on diabetes, its treatments, and complications. Whiting (2010) reports new data from China indicating a difference in the proportion of people with diabetes in urban and rural settings. According to Whiting, low- and middle-income countries typically show a prevalence rate of diabetes in urban areas that is at least double that in rural areas, while in higher – income countries, the prevalence is about the same. In the economically less-developed areas, the prevalence of diabetes is higher in the urban settings compared with rural settings. But in the economically developed areas, the prevalence is the same. The new prevalence estimates highlight the need to think of diabetes as a development issue and integrate diabetes care into the development and improvement of health systems worldwide (Whiting D., 2010).

Yang et al. (2010) report similar findings. This study states that in 2007-2008, among adults 20 years of age or older in China, there were 92.4 million persons with diabetes (50.2 million men and 42.2 million women) and 148.2 million persons with pre-diabetes (76.1 million men and 72.1 million women). An estimated 49.3 million persons with diabetes lived in urban areas, and 43.1 million in rural areas; an estimated 64.7 million persons with pre-diabetes lived in urban areas, and 83.5 million in rural areas (Yang et al., 2010).

A cross-sectional study of Chinese adults (20-74) from 2001-2002 of diabetes emphasized the need to improve the early detection and prevention of diabetes to prevent the emerging diabetes epidemic (Dong et al., 2005, October).

Other studies in both rural and urban China have documented diabetes rates. A cross-sectional health survey was conducted of 364,781 men and 405,011 women, age 35 and older, in 2004 in Tianjin, rural China (Tian, H. et al., 2009) . Subjects had an overnight fasting capillary whole blood specimen for glucose measurement and information on previous diabetes diagnosis was obtained by a standard questionnaire. The study results revealed the prevalence of previously diagnosed diabetes was higher in women and the Impaired Fasting Glucose (IFG) and diabetes prevalence was higher in the rural population of Tianjin.

A nested case control study in Shanghai, China, assessed the relationship between measures of central and overall obesity and risk of diabetes among 57,130 women 40 to 70 years of age at the Shanghai Women's Health Study (Rosenthal, et al., 2004). The risk of diabetes was more prevalent with increasing Waist-Hip Ratio (WHR) at all levels of BMI. The positive association between diabetes and BMI was observed among women with a low WHR. The results indicated that a stronger risk factor for diabetes was central obesity rather than overall obesity, therefore, WHR may be a better indicator of diabetes risk than BMI.

The Journal of the National Medical Association (2003) points to important ethnic differences in the Chinese which are helpful to understanding why diabetes is steadily increasing in China. According to the journal, smoking may be one such difference. Men cigarette smokers have a positive association with diabetes, and in China smokers

begin smoking at the age of 15-20 years. About 200 million children living today in China will become regular smokers. Of these, about 50 million, or one quarter, will die prematurely of smoking-related illnesses, including diabetes (Journal of the National Medical Association, 2003).

The British Journal Clinical Pharmacology (2006) has recommended improved regional and national awareness programs in China and international cooperation to improve outcomes among diabetics, as well as better understanding of traditional Chinese medicine among Western clinicians. An example of such collaboration is the nonprofit organization, the Beijing Chaoyang Hospital (BCH), founded by China and Britain. The organization is evaluating the use of traditional Chinese and Western medicines to manage diabetes and its complications, and collaborative efforts can be instrumental in reducing diabetes throughout the world (Donnelly, Wang, and Qu, 2006). Similarly, Pan (2005) recommends educating health-care practitioners on diabetes in China, a practice that encourages a team-based approach to reducing the disease's prevalence (Pan, 2005).

Pan (2005) also notes that Chinese media has been used to enhance the public awareness of diabetes. In 2002, television programs featuring diabetes issues reached about 600 million people. In collaboration with the World Diabetes Foundation, the Ministry recently launched the National Diabetes Management Project, which aims to provide diabetes education and training to health-care providers and establish state-of-the-art models of diabetes care in hospitals and community health centers throughout the country.

Another example of international collaboration in China is the relationship established between the German pharmaceutical company, Bayer Healthcare, and the Ministry of Health and the Chinese Medical Doctor Association to work with 31 cities in China providing education and training of physicians (Rising Prevalence of Diabetes in China, 2009).

Urbanization and economic development have had a negative effect on the overall health of Chinese people. Even though much of the population has lost traditional habits; corrections can be made with better adaptation to new lifestyles by eating healthy, exercising, and gaining knowledge of diabetes and other chronic diseases.

Diabetes in the Caribbean

The Caribbean refers to a large geopolitical region of the Americas situated on the Caribbean Plate and consists of the Caribbean Sea, its islands, and the surrounding coasts. The presence of European colonial powers in the region for hundreds of years has made the Caribbean a melting pot of ethnic groups, languages, and social customs. Caribbean people have moderate geographic mobility. Like many developing nations, Caribbean countries are undergoing significant demographic changes. According to the West Indian Medical Journal (2004), the Caribbean is now confronted with non-communicable disease (diabetes, hypertension, and cardiovascular disease) as well as infectious/communicable diseases, which doubles the burden for the region's countries.

Diabetes is increasing in the Caribbean because of lifestyle changes and as more people are becoming obese. Wilks, Rotini, and Bennett (1998) report the age-specific rates of diabetes in Jamaica among middle-aged persons (55-64 years) have increased

from 14.5% in 1972 to 21.8% in 1999. They state that most of this increase can be linked to lifestyle factors, specifically obesity, and although data is not available for many of the smaller countries, they believe all the islands are facing an emerging pandemic of diabetes. According to the Disease Control Priorities Project, in developing countries, age-adjusted death rates due to diabetes per 100,000 population in 1998 were 67.9, 53.4, and 105.1 for Barbados, Jamaica, and Trinidad, respectively (Disease Control Priorities Project, 2008). Data from the International Collaborative Study on Hypertension in Blacks (ICSHIB) has been used to determine the prevalence of chronic, non-communicable diseases in the African Diaspora. Using each population as a unit of analysis, the prevalence of obesity rose across the east-to-west geographic gradient from West Africa (i.e., Nigeria and Cameroon) to the Caribbean (i.e., Jamaica, St. Lucia, and Barbados) and then to African Americans in the United States (Luke, 2001). Women bore a disproportionate burden of obesity in the ICSHIB study; approximately one third of Caribbean women were obese, and another third were overweight (Luke, 2001).

Ramdath, Ramdhanie, Singh, and Prabhakar (2004), report the highest prevalence of diabetes in the Caribbean region is in Trinidad and Tobago, a rate that is approximately six times higher than that in North America. This study shows that clinic measurements of glucose were generally comparable to those at a reference laboratory, and almost twice as many females were affected, a trend the authors attribute to the overall greater rate of diabetes among females or the possibility that more women attend primary health clinics.

Clinical prediction models for diabetes in the Caribbean often use obesity as a predictor of diabetes, whether as BMI ($>30 \text{ kg/m}^2$) or central obesity (waist circumference $>94 \text{ cm}$ in men and $>80 \text{ cm}$ in women (Sargeant, 2004). However, waist circumference is not superior to BMI (at least in Jamaicans) as a predictor of diabetes.

The complications of diabetes include amputations, eye diseases, and renal failure, and high rates of these conditions in the Caribbean indicate a need for better screening and monitoring of the disease, which can also serve to reduce the mortality rates. (Pan American Journal, 2004) report very high amputation rates of feet among the diabetic. Their most detailed data came from Barbados: there they found the one-year incidence of lower-extremity amputations was 936 per 100,000 populations (557 per 100,000 for minor amputations and 379 per 100,000 for major amputations). According to Leske et al. (2002) the Barbados Eye Study found that most persons with diabetes had mild eye disease, whereas 8% had moderate changes and 1% had severe retinopathy, and Boyne (2009) states that because the burdens of glaucoma and cataracts are high, retinopathy screening and proper control of glycemia and blood pressure must play a role in prevention. In Soyibo (2006), the Caribbean Renal Registry reports diabetes accounted for 28% of the cases of end-stage renal disease in Jamaica, the Bahamas, Barbados, and Trinidad, while Tortola had the highest rate (46%), possibly because of the small numbers in the registry.

Diabetic patients need to be monitored closely and receive education on the complications of the disease, but developing countries are often not equipped with the proper tools to diagnose and manage diabetic patients. Barceló (2004) states that diabetes care in the Caribbean, as well as Latin American, is suboptimal because international

standards are not followed, using data from the Declaration of the Americas (DOTA) Quality of Diabetes Care Project, the DOTA Health Technology Assessment and the WHO/PAHO National Capacity Survey. The author recommends improved diagnostic and prevention programs to reduce deaths. Barceló cites the Chronic Care Model applied to diabetes as a framework to identify gaps in care delivery.

The WHO National Capacity Survey, conducted in 17 Caribbean countries including Jamaica, also sought to close gaps in care delivery in the treatment of diabetes. According to Barceló (2004), the WHO study results showed gaps in diabetes management at the clinic and public health level as well as a lack of facility, equipment for testing, and examinations rooms at clinics; lack of guidelines and health policies supporting medical care; and a lack of diabetes prevention. Also, a low proportion of eye and foot examinations, nutrition advice, and diabetes education were reported.

The Caribbean Health Research Council (CHC), in partnership with the Pan American Health Organization (PAHO), produced clinical guidelines for managing diabetes in the Caribbean primary care setting in 2006 (Caribbean Health Research Council, 2008). The CHRC/PAHO guidelines emphasize the use of metformin as pharmacotherapy, especially in overweight/obese persons, but otherwise allow the use of any anti-diabetes medication. Nutritional intervention is also highly recommended, but the Caribbean region suffers from a lack of trained nutritionists and dietetic professionals. Previously, in response to this need, PAHO and the Caribbean Food and Nutrition Institute produced a manual on the nutritional management of obesity, diabetes, and hypertension (Pan American Health Organization and the Caribbean Food and Nutrition

Institute, 2008). In addition to these regional guidelines, some countries (e.g., Jamaica) have also produced national guidelines (Guidelines for the Management of Diabetes, 2007).

Despite these national guidelines, however, Jamaican health-care professionals appear to be unable to implement the established guidelines successfully. Health-care professionals need training in intervention and prevention of diabetes. The CHRC/PAHO guidelines emphasized the need for trained nutritionists and dietetic professionals to provide nutritional intervention.

Diabetes care is improving in the Caribbean. Some countries are considering mobile therapeutic clinics for better accessibility, especially in inner-city and rural areas. Clearly, more work needs to be done (Boyne, 2008).

The authors agreed that laypersons could serve as good resources in the community to reduce diabetes. I agree with their findings. Laypersons in rural Jamaica were very instrumental in helping to identify women to survey. They were very resourceful and interested in the purpose of the study on diabetes 2 of women in rural Jamaica.

Primary prevention measures (lifestyle interventions), active diabetes screening, and surveillance will be needed. Because the origins of diabetes may also start from early life, more research is needed to define these mechanisms, as well as to implement suitable public health measures. According to Boyne (2008), primary prevention measures are needed to impact the incidence of diabetes, and interventions for women and children should occur earlier. Even in developed countries, diabetes appears to have

roots in infancy. Jessica Yadegaran reported in the *Washington Post* (February 13, 2011) that more babies are being diagnosed with obesity and one-third of infants are fat as a result of processed foods.

Diabetes in Jamaica

The high prevalence of diabetes may reflect the cultural acceptance of obesity especially in females. Social and economic factors actively encourage overeating and sedentary behavior and discourage alteration in these patterns. Overall, this study revealed inadequate knowledge, a low perception of risk, weak motivational factors and other important barriers to positive lifestyle changes and glycemic control in this population. Families, peers, and health-care providers are important sources of interpersonal influence that can increase or decrease commitment to and engagement in health promoting behavior. The respondents' reliance on the physician as the primary source of information indicates the need for a change from a prescriptive to a collaborative team approach involving individualized support for the client and family. Based on the findings of this study, diabetes education with trained diabetes educators has been incorporated as an "indispensable medical service" at this clinic (Tulloch-Reid & Waller, 2009, June).

The University Diabetes Outreach Project (UDOP), mandated to communicate all information about diabetes mellitus to the nation and to develop a 24-hour clinical service for those in need, has come a long way since its establishment in 1991. This international conference, the 10th since inception of the project, grew out of the early in-service training efforts to improve the skills of medical practitioners to deliver the appropriate

health care to diabetic patients. The conference, organized as it is around the theme, New Trends in Diabetes Management, promises to showcase the latest technologies and therapies available to persons suffering from the disease. (Hall, 2004).

In accordance with research, interviews, and observation, the University Diabetes Outreach Project is not highly visible in Clarendon and surrounding towns.

For most of the world, the solutions to the spiraling diabetes pandemic will involve improving access to proven but low-cost therapies, especially in low-income countries that face major environmental and social issues as well as poverty. Developing countries will need to be supported by international and national partnerships, but will ultimately need to take ownership and leadership of the solutions that they will need to implement. Country-specific data on the burden of diabetes are urgently required, together with a clear understanding of the extent of national policies for the prevention and care of diabetes. In developing countries, many vertical streams of excellence in delivering diabetes care exist. Yet all too often they work in isolation. Horizontal integration of their efforts would greatly enhance their effectiveness, (Pan American Health Organization, 2006).

The Caribbean Food and Nutrition Institute (CFNI) developed an informal training manual in the late 1990s for primary healthcare providers on the dietary management of diabetes. In collaboration with the Caribbean Program Coordination Office of the Pan American Health Organization (PAHO), the Ministry of Health in Jamaica developed a regional protocol for the nutritional management of diabetes, obesity, and high blood pressure (hypertension). The major goal was to improve the standards of care for people with diabetes in the Caribbean region. This manual provided

tools for nutrition management, including assessment, planning, implementation, coordination, and evaluation. This protocol will be launched in Belize, Jamaica, St. Vincent, and Guyana, and is expected to be instrumental in improving the quality of life of people living with diabetes in the Caribbean (Xuereb, 2005).

As the prevalence of youth onset diabetes in Jamaica increases, the impact of this disease on Health Related Quality of Life (QOL) needs to be evaluated. Patients from two major referral hospitals had QOL assessed using a modified diabetes - 39 questionnaire administered by a trained interviewer. The fifty-seven participants (21M and 36F) had anxiety about sexual functioning, later age onset, better glucose control and not using insulin. Measures to address anxiety and worry in Jamaican youth with diabetes need to be implemented to minimize the impact the disease may have on their QOL (West Indian Medical Journal, 2004).

Improvement in diabetes mellitus control is linked to better quality of life and survival. One of the most important challenges for public health in the field of diabetes mellitus is to monitor quality of care with the aim of introducing measures to assure better outcomes. A coordinated action plan for diabetes mellitus control and prevention is needed in the Caribbean. The fight against diabetes mellitus should involve governments, the scientific society and community organizations and should focus on improving quality of care and diabetes mellitus education."The growing global tsunami of chronic diseases in developing countries, and in particular Jamaica, requires urgent policy and public health intervention. The carbonated soft drink industry has infiltrated the consumption intake of young adults and children. Sugar in the form of sweets (lollipops, candies, etc.) is sold in every shop and supermarket, and at school gates in

Jamaica. Embedded in the increase in diabetes in children and young adults in Jamaica are parents' and children's nutritional intake (or lack thereof) as the dietary habits of Jamaicans have changed to include more fast foods and less nutrient dense diets . With the exponential increase in diabetes over the last 5 years in Jamaica, and the increase in unhealthy lifestyle practices of the people, coupled with the sales explosion of the carbonated soft drink industry and the increase in fast food outlets, Jamaica is experiencing a diabetes epidemic which cannot be resolved without government and policy interventions” (Bourne et al., 2010).

A study conducted by the University of the West Indies aimed to determine the level and type of preventive care offered to persons 50 years and older. This study identified barriers to prevention-related treatment in the primary healthcare system. The study collected quantitative data from 738 older patients during a six-week period from 86 health center staff members. The study results revealed good clinical practices; however, there were barriers to prevention-related activities and inadequate levels of prevention care practices. The conclusion was health workers needed training and appropriate resources for prevention activities for this population in order to fully address the needs. The World Health Organization contributed to the study design and funding of the fieldwork (Shearer, 2009). The University of the West Indies is developing collaborative relationships to improve prevention and intervention of chronic diseases.

The 3rd International DAWN Summit: From Research and Practice to Large-scale Implementation was held in Florence, Italy in April 2006. Godfrey Xuereb (Jamaica) described how the DAWN Call to Action has been instrumental in stimulating efforts to improve healthcare in Jamaica. The Caribbean Health Research Council, the Pan

American Health Organization, the Caribbean Food and Nutrition Institute, and the University of the West Indies Diabetes Outreach Programme (supported by the North American Region of the International Diabetes Federation and the WDF) have been working to provide effective and efficient diabetes services. The Diabetes Association of Jamaica has developed a diabetes lay educator program, which has trained 800 community leaders in Jamaica and 160 from across the region. To meet psychosocial needs, a curriculum for Diabetes Education the Caribbean has been drafted (Practical Diabetes International, 2006).

A Knowledge and Self-Reported Motivational Factors in Adults with Diabetes Mellitus study was conducted to determine the extent of knowledge, and self-reported factors that motivate patients with diabetes to make lifestyle changes. A random sample of men and women with diabetes mellitus was selected. This study indicated the need for structured educational programs, particularly in group settings, with specific targeting of older patients with diabetes mellitus. Age, educational level, length of time since diagnosis, gender and reported motivational factors must be considered in planning interventions. Doctors and other health-care providers need to increase their educational interaction with patients. The patients' reference to doctors as primary sources of information indicates the need for involvement of other members of the health team in planning and implementing effective education interventions (West Indian Medical Journal, 2004).

Listed below are major details from the Jamaica Health and Lifestyle Survey 2007-2008, Technical Report developed by the (Wilks et al., 2008) for the University of the West Indies. The study is a cross-sectional, interviewer-administered survey. Over a

four-month period, 2,848 individuals, ages 15 to 74, were recruited in their homes. The survey included completion of a questionnaire, collection of anthropometric measurements and testing of fasting blood glucose, cholesterol and by finger-prick blood sampling. The study presented results that emphasize that people living in rural Jamaica are more at risk to diabetes, heart disease, and hypertension. These risk factors were more related to women than men. The prevalence of diabetes was higher among rural women and hypertension and pre-hypertension was higher among rural dwellers, men and women. Participants with lower levels of education had hypertension and diabetes mellitus. Lower education was associated with being overweight and having a high waist circumference. Most people who were inactive had diabetes, obesity, and high cholesterol. Women had more cardiovascular risk factors. In this study, women were more likely than men to have coexistent risk factors at all levels of risk (Jamaica Health and Lifestyle Survey, 2007-2008). The study supports the need of a health program targeting women in rural Jamaica who are more prevalent to heart disease, high blood pressure, and diabetes.

A study that included Jamaican individuals examined the role of leptin in obesity (Luke et al., 1998). Leptin concentrations are highly correlated with body fat stores. This study, which included individuals in Nigeria (n = 363), Jamaica (n = 372), and the United States (Maywood, IL; n = 699), supports the hypothesis that obese individuals exhibit leptin resistance (Luke et al., 1998).

As in other Caribbean countries, prevention and intervention for diabetes is lagging. According to West Indian Medical Journal, 2004, Jamaican health practitioners and their patients are reluctant to advance to medical therapy such as insulin therapy,

despite the fact that Type 2 Diabetes is a progressive disease and can be managed with insulin therapy, proper diet, and exercise. Education for health practitioners and their patients on insulin therapy is recommended.

Irving et al. (2008) examined the early onset autosomal dominant Type 2 Diabetes among 698 Jamaican women. Pregnant women (1,000) without a family history of diabetes were identified during the same period at the Antenatal Clinic. The early onset autosomal dominant type diabetes is defined as having two or more first-degree relatives with Type 2 Diabetes diagnosed before age 35. The conclusion of the study was family history of early onset autosomal dominant Type 2 Diabetes appears susceptibility to gestational diabetes mellitus (GDM) in Jamaican women. Health practitioners should obtain information from patients related to family history (Irving et al., 2008).

In the Caribbean and the United States, an increase of obesity is associated with a prevalence of hypertension, especially in women, and the mortality rate for women is falling compared with men. In the International Collaborative Study on Hypertension in Blacks (ICSHIB), according to Guillford (2003), an analysis was made of blood pressure, hypertension and hypertension management. Women demonstrated more frequent obesity and hypertension. Hypertension and related disorders need to be addressed were findings in this study. This holds true with diabetes as well as hypertension, and knowledge gaps need to be closed so that interventions can be implemented to combat chronic diseases (Guillford, 2003).

Samuel (2005) administered a questionnaire survey (BRFSS) of risk factors of Type 2 Diabetes in rural Jamaica (Ocho Rios and St. Ann's Bay), among women and men. Women, ages 18 to 85, were the largest percentage (59.9) of the population

surveyed. The study revealed diabetes prevalence was higher in the 26 – 45 age group among black married women with a high school education. The project found that women had a greater risk of diabetes than male. Obesity was strongly related to an increase risk for hypertension. Because of eating habits, Seventh Day Adventists were less obese than Protestants. More than 70% of rural Jamaicans surveyed were overweight or obese. The lack of access to health was a problem of participants without health insurance.

Jamaica is making strides in defining the impact that social conditions, education, culture beliefs, and economics have on chronic diseases. Nevertheless, more is required to reduce this devastating increase of chronic diseases. It is critical that policies and programs are implemented to improve the affects of chronic diseases in Jamaica.

CHAPTER III

METHOD

Design

The purpose of this project is to assess the risk factors associated with Type 2 Diabetes of Jamaican women in rural Jamaica. The research will determine if relationships are among the risk factor variables of Type 2 Diabetes of Jamaican women in rural Jamaica. The design was used by Dr. Cheryl Samuel's assessment of the risk factors for Type 2 Diabetes in rural Jamaica, 2005. The design was selected based on historical uses in the United States and in international populations using the Behavioral Risk Factor Surveillance System (BRFSS).

Research Setting

A cross-sectional, population-based survey was conducted in the border communities of Clarendon, Jamaica. May Pen, the capital of Clarendon, is located in Middlesex County. May Pen is a rapidly growing rural town in the center of an agricultural area in the third largest parish in Jamaica (Bridge Palm., n.d.) The survey was conducted November 7, 2010 to November 14, 2010 in Clarendon, Jamaica and surrounding areas.

Sample

Surveys were conducted in communities based on weighted analysis of the population of towns in Clarendon and surrounding areas. The May Pen Hospital hosted the survey; however, other communities were surveyed in the Southern Regional Health

Authority in Clarendon. The population of 200,000 is low to moderate income (Bridge Palm, n.d.). The study was designed to survey 1,000 adults with expectation of acquiring a desired sample of 900. The total number of surveys conducted was 890 with 801 completed survey questionnaires. The instrument used was consistent with the population.

Women, 18 years of age or older were surveyed at the May Pen Hospital, nursing schools, colleges, churches, and in Clarendon's surrounding communities. Dr. Samuel's survey was conducted in St. Ann Parish, located on the northern part of the island in rural Jamaica and targeted men and women.

Instrument

The survey instrument is a modified version of the Behavioral Risk Factor Surveillance System (BRFSS), administered and supported by the CDC's Behavioral Surveillance Branch. The tool is designed to measure behavioral risk factors in the adult population (18 years of age and older) living in households. The BRFSS was initiated in 1984, with 15 states collecting surveillance data on risk behaviors through monthly telephone interviews. Over time, the number of states participating in the survey increased, so that by 2001, 50 states, the District of Columbia, Puerto Rico, Guam, and the Virgin Islands were participating (Samuel, 2005). This survey instrument met the needs of the target population.

The BRFSS data was used to identify the prevalence and incidence of diabetes and other co-morbidities within the population of Clarendon and surrounding areas. A copy of the instrument is in Appendix A.

Procedure

Five interviewers were recruited and trained to assist in conducting the survey. The interviewers were recruited from the School of Practical Nursing in May Pen. The nursing students were familiar with the island and had exceptional communication skills. The students attended training, which included role-playing and received information on the time-line of the project.

The interviewers were able to explain the study in detail and were equipped to assist participants in completing the questionnaire. A meeting was held with the interviewers at the end of each day. All participants completed the informed consent form approved by the Institutional Review Board of Central Michigan University. The interviewers maintained records providing the number of refusals to participate and specific reasons for not participating.

Participants completed the questionnaire in English. Questions were read to participants as needed. The questionnaire required approximately 15 minutes to complete. Interviewers reviewed completed questionnaires to ensure accuracy. The study questionnaire assessed the risk factors for health-care access, diabetes, history of chronic disease, prevention campaigns, and chronic screening exams. Households, hospitals, schools, and neighborhood gathering places were surveyed.

Statistical Analysis

All completed questionnaires were reviewed and incomplete questionnaires were discarded before data entry. Questionnaires were randomly selected (20%) and were randomly checked for data entry errors. The SPSS 16.0 statistical application was used

for analyses. The Kruskal Wallis test was used to determine whether there were significant differences of BMI distributions in different categories of factors, since the normality assumption of ANOVA was not met. The relationship between BMI and the significant variable was explored by Mann-Whitney U test with a significance level at 99%.

Conclusions

Studies cited throughout this study on the global incidence of diabetes and its complications support the need for more emphasis on clinical and public health approaches, governing policies and procedures, health promotions and screenings, community empowerment and partnerships, and improved communications between healthcare professionals and their patients. Lifestyle changes to incorporate exercise regimens and improved eating habits will help reduce the global burden of this chronic disease. The cultural belief that it is acceptable for women to be overweight or obese needs to change.

A host of chronic diseases, such as cardiovascular, high blood pressure, and diabetes, must be approached collectively to gain recognizable prevention and intervention strategies. These chronic diseases – compounded with depression, HIV/AIDS, an aging population, disability, lack of training among physicians and nurses, and a slow economy – affect the overall improvement of life and health. Jamaica needs to implement a systems approach for managing chronic diseases throughout the island. The research shows that improvements are needed in disease screening, management, prevention, and treatment. The Ministry of Health, University of the West Indies, Pan

American Health Organization, International Federation of Diabetes, World Health Organization, and other organizations have conducted studies and established policies to improve the management of diabetes in Jamaica. Jamaica's challenges are well known, but effective worldwide implementation of public health policies and treatment modalities are difficult. The government, healthcare system, and the community must take the next steps to improve and implement health outcomes in Jamaica.

CHAPTER IV

ANALYSIS OF DATA

This study assessed the risk factors for Type 2 Diabetes of adult women in rural Jamaica. This project identified the risk factors for Type 2 Diabetes using the BRFSS and actual measurements taken during the survey to calculate the body mass index (BMI) for each subjects. The data was collected November 7 through November 14, 2010, and was explored by calculating the prevalence of risk factor rates of self-reported diabetes, obesity by age group, and ethnicity. First, frequency tables of categorical variable in the study are provided followed by descriptive statistics of continuous variables, including weight, height and body mass index (BMI). Second, the Kolmogorov-Smirnov test of BMI is conducted to test normality. Then non-parametric tests are used to explore the relationship of BMI and risk factors of diabetes.

The data collection included obtaining the measurement of height and weight. Body mass index was obtained by dividing the weight by the height squared. The weight and height of the respondents were measured in pounds and inches. Then, each respondent's body mass index was calculated by weight divided by height squared. Measurements and calibrated scales were used to obtain weight and height. Weight was measured without excessive clothing and without shoes.

Risk factor data was collected with the questionnaire from the BFRSS. As discussed in the Methods Chapter, the BFRSS, a statewide questionnaire is used to assess risk factors for common diseases in the United States. The questions are categorical and assign value based on the selected response of the respondents. Risk factors for Type 2

Diabetes usually include the body mass index, diet, physical activity, family history, smoking and history of other co-morbidities such as high blood pressure (CDC, 2003). Demographic data such as age, gender, race, and income may also impact risk. This type of demographics was collected during the survey including measurements in a single session for each respondent.

Description of the Sample

During the survey period (November 7 – 14, 2010), 890 surveys were collected in Jamaica; 89 were incomplete with at least one unanswered question and were discarded, leaving 801 surveys for this analysis.

To give an overview of demographic characteristics of the respondents evaluated, the frequency statistics are presented in Table 1. Among the respondents evaluated, 87.4% were black (n=700), 1.5% were white (n=12), 1.6% were Chinese (n=13), 6.2% were Indian (n=50) and 3.2% were other (n=26).

All the respondents were adult women, 34.3% were between 18 and 25 (n=275), 24.1% were between 26 and 35 (n=193), 17.4% were between 36 and 45 (n=139), 13.9% were between 46 and 55 (n=111), 6.0% were between 56 and 65 (n=48) and 4.4% were above 65 (n=35). More than 40% had never been married and 27.3% were married. About 50% of the respondents are employed, while 60% of the respondents' household incomes were less than \$40,000 (Jamaican currency) which is equivalent to around \$400 American dollars. These data are detailed in Table 1.

Table 1. Demographic Characteristics of Age, Race, Marital Status, Educational Level, Employment and Household Income

		Frequency	Percent
Age	18-25	275	34.3
	26-35	193	24.1
	36-45	139	17.4
	46-55	111	13.9
	55-65	48	6.0
	65 and older	35	4.4
Race	White	12	1.5
	Black	700	87.4
	Chinese	13	1.6
	Indian	50	6.2
	Other	26	3.2
Marital Status	Married	219	27.3
	Divorced	25	3.1
	Widowed	34	4.2
	Separated	41	5.1
	Never Married	344	42.9
	Unmarried couple	138	17.2
Educational Level	Never or kindergarten	16	2.0
	grades 1-8	110	13.7
	grades 9=11	247	30.8
	grade 12 or GED	201	25.1
	college 1-3	154	19.2
	college 4 or more	67	8.4
	Refused	6	.7
Employment	Employed for wages	244	30.5
	Self-employed	145	18.1
	Out of work for more than 1 yr	37	4.6
	Out of work for less than 1 yr	14	1.7
	Homemaker	24	3.0
	Student	276	34.5
	Retired	31	3.9
	Unable to work	25	3.1
	Refused	5	.6
Household Income	less than 40,000	487	60.8
	40,000 to 79,999	115	14.4
	80,000 to 299,999	73	9.1
	310,000 to 499,999	36	4.5
	500,000 to 999,999	30	3.7
	1 million to 1,499,999	25	3.1
	1.5 million to 2,999,999	15	1.9
	3 million and over	20	2.5

Table 2 shows the summary statistics and confidence intervals of respondents' height, weight and BMI. As we can see from the table, the confidence interval of mean of BMI is from 26.6 to 28.0. Based on World Health Organization data, this BMI range is in the category of overweight. To further access the distribution of BMI, the histogram of BMI is given in Figure 1. From the graph we can see that there are several outliers on the right, indicating a number of respondents are not only obese but are extraordinarily so. Logarithm transformation is being use to ease the skewness of BMI (the histogram of transformed data are shown in Figure 2), but the transformed data still cannot pass the Kolmogorov-Smirnov test of normality at 5% significant level as shown in Table 3. Thus, nonparametric tests are adopted for further analysis.

Table 2. Descriptive Statistics and Confidence Interval of Height, Weight and BMI

	Test Value = 0				
	Mean	Std. Deviation	Range	99% Confidence Interval	
				Lower	Upper
Height (inches)	64.8798	4.66248	50.00	64.4544	65.3051
Weight (lbs)	1.6151E2	36.41075	316.00	158.1889	164.8324
BMI	27.3092	7.62656	80.29	26.6134	28.0050

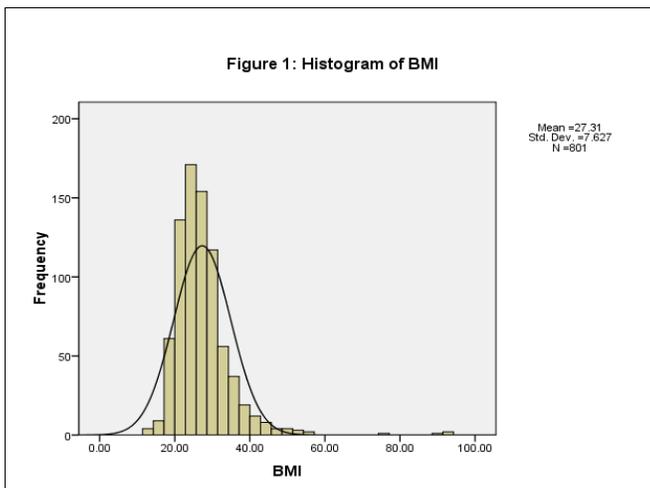


Figure 1. Histogram of BMI

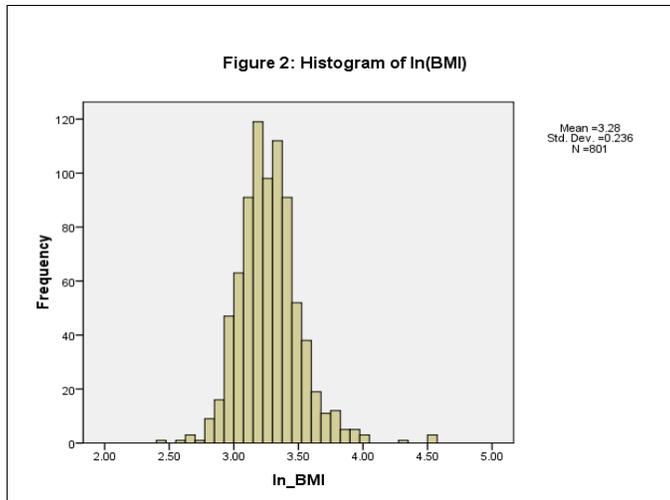


Figure 2. Histogram of ln (BMI)

Table 3. One-Sample Kolmogorov-Smirnov Test of Log (BMI)

		ln_BMI
N		801
Normal Parameters a	Mean	3.2770
	Std. Deviation	.23631
Most Extreme Differences	Absolute	.051
	Positive	.051
	Negative	-.033
Kolmogorov-Smirnov Z		1.439
Asymp. Sig. (2-tailed)		.032
a. Test distribution is Normal.		

Table 4 shows that more than 25% of the respondents in the survey are obese and more than half of the responses are overweight or obese. Although only about 15% of them have been diagnosed to have diabetes, more than 40% of the respondents' immediate families have diabetes. The health insurance situation is not optimistic either; more than 70% of the respondents do not have health insurance.

Table 4. Demographic Characteristics by BMI Categories, Self-reported Diabetes, Family History of Diabetes, Health Insurance, Health Check-up and Diabetes Education

		Frequency	Percent
BMI Category	Underweight	31	3.9
	Normal	304	38.0
	Overweight	263	32.8
	Obese	203	25.3
Self-reported Diabetes	Yes	104	13.0
	No	675	84.3
	Not sure	5	.6
	Told only during pregnancy	17	2.1
Family History of Diabetes	Yes	347	43.3
	No	393	49.1
	I don't know	61	7.6
Health Insurance	Yes	221	27.6
	No	570	71.2
	Not sure	10	1.2
Health Check-up	Yes	628	78.4
	No	119	14.9
	more than 5 times	48	6.0
	Not sure	6	.7
Diabetes Education	Yes	457	57.1
	No	325	40.6
	Not sure	19	2.4

To further investigate which factors influence BMI in rural Jamaica, Kruskal Wallis test was used to determine whether there were significant differences of BMI distributions in different categories of factors, since the normality assumption of ANOVA was not met. Table 5 shows the significant factors that distinguish the distribution of BMI and Mann-Whitney U test is used for pairwise group comparison with significance level 99%. Results of the test revealed a significant difference of the dependent variable body mass index, in different group of age ($p=.000$), exercise ($p=.021$), family history of diabetes ($p=.000$), diagnosed diabetes ($p=.000$), high blood pressure ($p=.000$), and health insurance ($.000$). The follow up Mann-Whitney U test indicates that women, above age 36, have significant

higher BMI. Also, women who did not participate in any physical activities or exercise have significantly higher BMI compared with women who exercise. Both diagnosed diabetes patients and women with high blood pressure or immediate family having diabetes also have significant higher BMI compared with others. Also, there is an interesting finding that women in Jamaica with health insurance have higher BMI. In addition, the Seventh Day Adventists have significantly lower BMI compared with other Protestants due to food habits linked to religious practices.

Table 5: Kruskal Wallis Test for Independence of Multiple Groups of BMI with Mann-Whitney U Test for Pairwise Group Comparison

	Categories	N	BMI Mean Rank	Group
Age	18-25	275	306.88	C
	26-35	193	411.28	B
	36-45	139	465.79	A
	46-55	111	473.86	A
	55-65	48	501.29	A
	65 and older	35	457.90	A
Exercise	Yes	534	388.04	B
	No	255	431.93	A
	Not sure	12	320.62	B
Family History of Diabetes	Yes	347	453.14	A
	No	393	363.85	B
	I don't know	61	343.75	B
Diagnosed Diabetes	Yes	104	500.07	A
	No	675	386.34	B
	Not sure	5	379.50	B
	Told only during pregnancy	17	383.32	B
High Blood Pressure	Yes	206	504.98	A
	No	559	363.66	B
	Not sure	36	385.81	B
Health Insurance	Yes	221	452.18	A
	No	570	383.32	B
	Not sure	10	277.80	AB

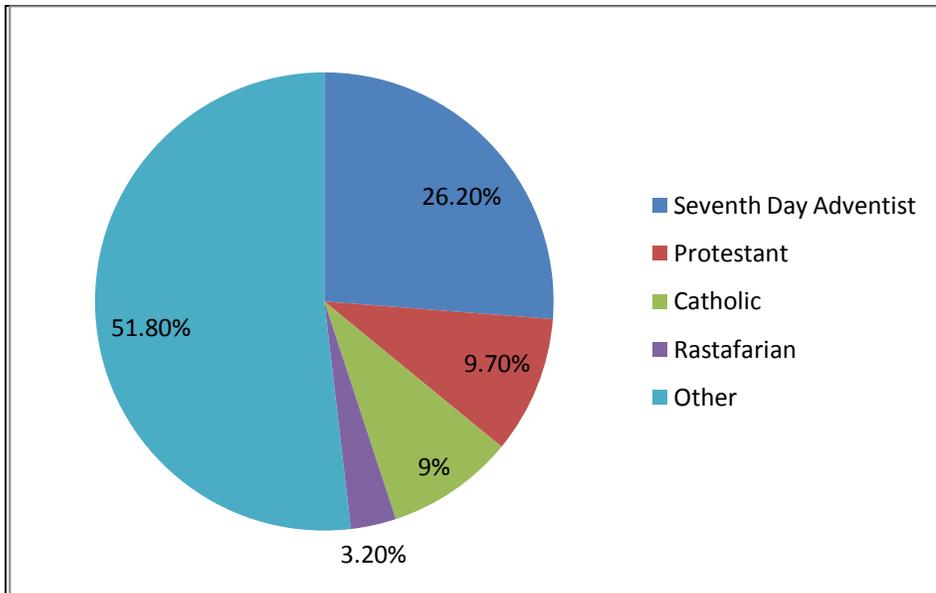


Figure 3. Pie Chart of Religions

As the chart above shows, more than half of the respondents indicated that their religion was something other than the four choices provided in the survey. Among the four religions listed, Seventh Day Adventist is the most popular, with more than one-fourth of the respondents selected that choice. Rastafarianism is an African-influenced religion whose followers believe in the teachings of the King James Bible. Rastafarianism contains elements of Christianity, but is not considered a standard Christian denomination. Other religions are Church of God, Baptist, Pentecostal, Anglican, United Church, Jehovah's Witness, Brethren, and Moravian. There is a great deal of variety in Jamaica's religion Jamaica (Religion:Jamaica-guide.information, 2010).

Dietary practices are a part of the Seventh Day Adventist and Rastafarianism; both have vegetarian diets. The following chart lists the results of analysis of religions specified by respondents in the survey.

Table 6. Analysis of Religions

		Frequency	Percent	Cumulative Percent
Valid	Seventh Day Adventist	210	26.2	26.2
	Protestant	78	9.7	36.0
	Catholic	72	9.0	44.9
	Rastafarian	26	3.2	48.2
	Other	415	51.8	100.0
	Total	801	100.0	

Limitations of the Study

BFRSS diabetes data are self-reported and are subject to bias. For example, some women who have Type 1 Diabetes might not have a good understanding of the question on the survey questionnaire. Some respondents have undiagnosed diabetes due to knowledge deficit, and also may not have a clear understanding of diabetes and its symptoms.

Literacy of respondents may vary survey interpretation. Some of the respondents were unable to read, therefore, questions had to be read to them.

Because of the way the questions were phrased, clinical differentiation of type of diabetes was limited with self-reported data.

Limitation of Survey Questionnaire

Recent flooding made it difficult for the team to travel to some parts of Clarendon and surrounding areas. The shoulders of the roads were washed away, fallen rocks were in the road, and large potholes made travel dangerous.

CHAPTER V

FINDINGS AND CONCLUSION

Findings

According to the World Health Organization, the crude prevalence rate of diabetes in the adult population in Jamaica is 13.4% (95% CI 11.5, 15.2) of a total population of 2.5 million of mainly African descent. Factors contributing to poor control of diabetes mellitus in this population include cultural beliefs and lack of education. Persons with diabetes mellitus generally have a poor knowledge of care, and there is usually no consistency in the way information is delivered to them. Although the prevalence of diabetes is high in Jamaica and the level of control is unacceptable, few studies have been done to inform on factors influencing knowledge and positive lifestyle changes. The Knowledge, Motivation and Barriers to Diabetes Control in Adults in Jamaica study was designed to explore the Jamaican adult's knowledge of diabetes, motivational factors, and identify possible barriers to positive lifestyle changes and glycemic control.

The main source of information for participants was the physician, and the majority (71%) reported the need for more education. Several (7.5%) suggested that the doctors needed to be more assertive with patients, and that they needed to explain more about diabetes and describe the complications of diabetes in greater detail (12.0%). Respondents also commented that the doctors needed to be more approachable as sometimes they were afraid to ask the doctors any questions including explanations of their laboratory results. A few (12.7%) respondents also indicated the need for financial

assistance in order to manage their diabetes. Many respondents were unable to define the word “diabetes” and some believed that diabetes could be cured.

Jamaica has taken the initiative to work with organizations such as the Pan American Health Organization (PAHO) to promote healthy lifestyles. The PAHO has partnered with the Ministry of Health to work with churches and faith-based organizations to respond to the prevalence of chronic diseases and the need to promote healthy lifestyles (Live Stream, 2010).

On February 18, 2011, the University of the West Indies launched ‘Live Life’ to promote healthy lifestyles programs and increase the intake of fruits and vegetables. A balance of fruits and vegetables helps to maintain a balanced blood sugar, better energy, and increases the immune system. This initiative seeks to promote healthy lifestyle habits and prevent chronic disease within Jamaica (Live Stream, 2011).

The BRFSS survey results of women in Clarendon, Jamaica, revealed that more than 25% of the respondents were obese and more than half of the respondents were overweight. Although only about 15% had been diagnosed with diabetes and more than 40% of the respondents’ immediate families had diabetes; more than 70% of the respondents did not have health care insurance. Further testing revealed that women, age above 36, had significant higher BMI. Women who were diagnosed with diabetes and high blood pressure or those whose immediate families had diabetes also had significant higher BMI compared to others. Women who did not participate in any physical activities or exercises had significant higher BMI compared to women who participated. Also, women in Jamaica with health insurance have higher BMIs. Additionally, the Seventh Day Adventist had significantly lower BMIs compared to Protestants.

Obesity and being overweight are prevalent among women in rural Jamaica. Being obese and overweight are highly acceptable in Jamaica's culture, as it is, in African, African-American, and the Hispanic community. This risk factor is a cause of chronic diseases (diabetes, hypertension, and cardiovascular) of women in rural Jamaica. This mindset needs to be changed and healthy lifestyles of eating healthy and exercising must be practiced to reduce risk factors for these chronic diseases.

The leading causes of mortality and morbidity are chronic non-communicable diseases. Diabetes is steadily increasing in Jamaica. Diabetes and other chronic diseases disproportionately affect women. A higher prevalence of obesity is presented among women in rural Jamaica. Health challenges are presented in lifestyles and a familial history of chronic diseases. A significant size of the population are unaware of their condition and don't know what diabetes means. Diabetes is more common among people who are poor, uneducated, and are not receiving public awareness from the healthcare system. Most of these people are living in rural Jamaica.

Prevention and education, lack of early diagnosis, inadequate resources, untrained doctors and nurses, and lack of communication between patients and their physicians are serious contributing factors for the burden of diabetes on the Island and its residents.

A large percentage, estimated to be over 50%, of diabetes is attributed to the body mass index. Several studies showed moderate exercise (30 minutes) five times a day every week could significantly reduce the onset of Type 2 Diabetes.

The Jamaica Health and Lifestyle Survey, 2007-08, a cross-sectional interviewer-administered survey, shows that the prevalence of diabetes and impaired fasting glucose was higher among rural women compared with urban women, and hypertension and pre-

hypertension was higher among rural dwellers across genders (Wilks, Younger, Tulloch-Reid, McFarlane, & Francis, 2008). The Technical Report was developed by the University of the West Indies. The comprehensive survey was conducted across the island and examined the health challenges rooted in lifestyle practices that Jamaicans face. This valuable report will serve to impact public health policy.

A summary of the review of data on Diabetes from the United States, Britain, Canada, China, Caribbean, and Jamaica literature review revealed these statistics and findings:

United States

- 23.6 million people in the United States have diabetes
- 9.3 million women have diabetes; 2.7 million African Americans and 2 million Hispanic/Latino Americans
- African-American women have a higher obesity rate and a high incidence of Type 2 Diabetes, obesity, and hypertension
- Type 2 Diabetes accounts for about 90% of all diagnosed cases of diabetes
- Rural residents are more likely to have greater burdens of chronic disease, including uncontrolled diabetes

Britain

- 2.6 million people have been diagnosed with diabetes (90% with Type 2 Diabetes) in the United Kingdom as of 2009
- Among women, diabetes is more than 5 times as likely among Pakistani women and at least 3 times as likely in Bangladeshi and Black Caribbean women, and 2.5 times as likely in Indian women, compared with the general population

- Type 2 diabetes is 6 times more common in people of South Asian descent and 3 times more common among people of African and African-Caribbean origin
- 22% of the population is estimated to be obese and 75% overweight

Canada

- Type 2 Diabetes affects approximately 90% of Canada's population of more than 33 million
- The prevalence of diabetes among aboriginal Canadians is several times the Canadian average
- Aboriginal women live an average of 5 years less than the Canadian average
- In 2005, 32.5% of Canadians were reported to be overweight, with 14.9% considered obese
- A study conducted across Canada has shown a significantly higher proportion of rural females were obese in comparison with urban females

China

- Almost 1 in 10 adults has diabetes among a population of 1.3 billion people
- People in rural areas have experienced reduced access to medical care
- The prevalence of diabetes is higher in urban settings than in rural settings
- The prevalence of diabetes among Chinese women who live in large cities is similar to the prevalence of diabetes in the United States population

Caribbean

- Caribbean countries have seen a dramatic increase in Type 2 Diabetes
- Type 2 Diabetes is one of the leading causes of morbidity and mortality in the Caribbean

- The population's attributable risk for diabetes is an estimated 66% for body mass index (BMI) and 80% for waist-hip ratio
- The prevalence estimates of diabetes and impaired fasting glucose combined was higher among rural women than urban women; hypertension and pre-hypertension was higher among rural dwellers for both men and women
- Overweight and a high waist circumference are most frequent in the lowest educational category

Of all the major countries considered, Britain had the lowest rate of Type 2 Diabetes and China has the highest. For all countries considered: chronic diseases must be approached collectively to create coherent prevention and intervention strategies and more emphasis should be placed on clinical and public health approaches, including government policies and procedures; on health promotions to encourage lifestyle changes, diagnostic screenings, community empowerment and partnerships, and improved communications between healthcare professionals and their patients.

For Jamaica in particular, women in rural areas are disproportionately affected by diabetes; almost 150,000 Jamaican nationals have diabetes, are overweight and have a high waist circumference. Being obese or overweight is culturally acceptable for women, and occurs most frequently among the least educated. Inactivity among women is associated with diabetes, obesity, and having high total cholesterol. However, lifestyle and risk factors among Jamaican women are comparable to those of women in the United States, Britain, Japan, Canada, China, and other Caribbean countries, although rural Jamaican women tend to be particularly susceptible to Type 2 Diabetes. As with populations, in other countries, lifestyle changes among rural Jamaican women such as

healthy eating and exercising can significantly reduce the occurrence of diabetes and its costs. Determining and applying best practices worldwide for the prevention and care of chronic illnesses including diabetes can improve healthcare services and outcomes for all women.

The Anglophone Caribbean is caught in the throes of the obesity and diabetes pandemics. Although atypical diabetes is prevalent in this region, Type 2 Diabetes is the major public health burden, with prevalence rates higher than those reported in many developed countries. Compounding this burden are staggering projected incidence rates for obesity and, thus, diabetes. Macrovascular and microvascular complications already are common; therefore, it will be hard for these developing nations to survive the loss of productive manpower, direct costs, and indirect costs associated with diabetes.

Consequently, primary prevention measures (lifestyle interventions), active diabetes screening, and surveillance will be needed for the 21st century. Because the origins of diabetes may also start from early life, more research is needed to define these mechanisms, as well as to implement suitable public health measures. These intervention strategies should probably be directed toward women of child-bearing age, as well as children. This strategy may result in interventions for diabetes (and other chronic, non-communicable diseases) throughout the lifespan. However, the precise nature of such interventions is undefined. In persons with diabetes, greater attention will be needed to systematically improve concurrent risk factors (i.e., blood pressure, lipids, use of antiplatelet agents) and reduce glycemia. Sex-specific measures may be needed because women carry a disproportionate burden of obesity and diabetes (Boyne, 2008).

People living in rural Jamaica seems to be more at risk for diabetes, hypertension, and heart disease, especially women. More emphasis needs to be placed on those living in rural Jamaica. Much of this research supports more women are obese or underweight and are sedentary, and information and education on diabetes and its complications does not appear to be reaching this population.

Jamaica has had some valuable studies conducted on diabetes, good human resources, and policies developed that may reduce the prevalence of diabetes. The next step is a monitored implementation program.

Recommendations

Chronic illnesses, globally, are the leading cause of mortality, particularly, in developing countries. The incidence of diabetes is more prevalent among Jamaicans than people living in North America and many European countries. To improve diabetes outcomes, studies support a decrease in cost and complications when blood pressure and glycemic are controlled by physicians and patients. It is important for patients to have a clear understanding of diabetes and the risk factors. Patients should be targeted with education on the possibility of insulin therapy and the importance of nutrition intervention. Community mobilization and volunteerism could help to reduce the incidence of diabetes as well as represent a more economical way of reaching and educating community members on chronic diseases and how they interrelate. Mobilization of the community would provide a much needed collaborative team approach. Lay people would need training in diabetes prevention and care. Earlier education and changes in school lunch programs would be very beneficial to families in

rural Jamaica. Another popular approach is utilizing mobile therapeutic clinics to gain access to people in rural areas. In Clarendon, a large percentage of people do not have transportation and the roads are very dangerous and in need of repair. A taxi ride to see a physician in May Pen may take up to two hour from Frank Field, because of the poor conditions of the roads.

World Diabetes Day is celebrated worldwide and was initiated by the International Diabetes Federation and the World Health Organization for awareness purposes. The participation in this celebration would be worthwhile to implement in outreach strategies. Research shows that international collaboration to improve health-care services, treatment and overall outcomes for diabetic patients is more prevalent. For example, the University of Nottingham and the Imperial College linked with Beijing according to the British Pharmacological Society. Developing collaborative relationships and seeking assistance through grants would represent opportunities to improve Type 2 Diabetes outcomes. Jamaica can also use television and other media outlets to feature diabetes information. These strategies will represent a stronger alliance for addressing diabetes and building capacity for prevention of diabetes in Jamaica.

Federation Diabetes Action is an initiative that targets low-income communities specifically in developing countries to support effective measures for preventing and controlling diabetes and may be a good resource. The program strives to achieve a substantial increase in global awareness about diabetes and its complications. The goals are: work to achieve a major increase in awareness about diabetes, its complications, and its prevention, particularly among health policy makers in low and middle-income countries and communities; initiate and support projects to generate and widely disseminate new

knowledge on awareness about diabetes and its economic impact in low and middle-income communities; produce and widely disseminate a new scientifically based review on the prevention of diabetes and the complications of diabetes; produce up-to-date, practical guidance for policy makers in low- and middle-income countries, on the contents, structure, and implementation of national diabetes programs; and provide and maintain a web-based resource to help policy makers implement national diabetes programs.

Health systems that are able to deliver optimal care need to be designed around the needs of the persons with the condition, as on a day to day basis most diabetes care is undertaken by the persons with diabetes and not the health professional. Diabetes education plays a key role in empowering people with the knowledge and skills to manage their own condition effectively. (Diabetes Action Now Booklet, 2010). Education must include increased physical activity, weight loss, a healthy diet, and nonsmoking.

Traditionally health services have been tailored for acute conditions, and Jamaica has had good experience controlling communicable diseases through immunizations and correction of dehydration. However, the management of non-communicable diseases (NCDs) has not achieved the required level of quality to address the shift of the epidemiological pattern in the Caribbean and in Latin America towards the NCDs. People from the lower socioeconomic levels are disproportionately affected by chronic diseases such as diabetes. Factors, such as the length of the disease, the cost of medication, and the requirement of specialized care make it obvious that medical care must be re-designed to cope with the needs of chronic conditions, such as diabetes and hypertension.

Diabetes care and education are among the most important aspects in the fight against diabetes. Improvement in diabetes control is linked to better quality of life and survival. One of the most important challenges for public health in the field of diabetes is to monitor quality of care with the aim of introducing measures to assure better outcomes. The available information suggests that diabetes care in Latin American and the Caribbean is sub-optimal. Good practice guidelines are essential to reducing complications from diabetes. While diabetes control guidelines have been published for the Caribbean, their use is not optimal and there is still paucity in the data on the quality of diabetes care.

The problem of diabetes is reaching epidemic proportions in the Caribbean. In Jamaica the prevalence of diabetes is estimated at 12%-16%, of which one-third is undiagnosed. There is evidence that the prevalence of diabetes in Jamaica has increased. A multicenter evaluation of diabetes care in Jamaica identified deficiencies in diabetes management that are similar to those reported in other middle-income countries. Good quality of diabetes care should be an essential goal of health care delivery systems. Both individual healthcare providers and clinics need to regularly reevaluate their standards and practices in order to reduce the burden of diabetes in middle-income countries (Wilks, 2002).

There is a continuous need to evaluate intervention and prevention strategies at the community level and to design and promote policies to encourage healthy behaviors. During the process of conducting my questionnaire, I found the community members were open to partnerships to improve the overall health in their communities. I believe Centers of Excellence of Women's Health could be strategically established in

communities by local health systems, such as the May Pen Hospital to target diabetes, high blood pressure and cardiovascular disease among women. Very few governments have been available to meet the full needs of the social service sector through budgetary allocations. However, the deficiency of government funding and short falls in organizations and agencies offering service mitigated by volunteers who have formed groups or associations. Not all volunteers have formal organizations, however, and many persons wanting to “give back” have no idea where to go. Volunteerism is the core of the development and sustainability of many services whose clientele are persons who are limited in their ability to meet basic social, health, and welfare needs. And so the opportunity exists to engage persons who are already organized as well as individuals seeking to give service to become active players in your organization, for the benefit of the organization, the benefit of the client group and of the country as a whole West Indian Medical Journal (2004).

A coordinated action plan for diabetes mellitus control and prevention is needed in the Caribbean. The fight against diabetes mellitus should involve governments, the scientific society and community organizations and should focus on improving quality of care and diabetes mellitus education (Barceló, 2004).

Research has shown that Type 2 Diabetes is greatly associated with race/ethnicity. American Indians, American Hispanic/Latino, Asian, Native Hawaiians, African Americans and other Pacific Islanders are at high risk for Type 2 Diabetes. In fact, studies have revealed that blacks are up to two times more likely than whites to have diabetes. Women are more likely to be overweight or obese, perform a low level of physical activity and have chronic non-communicable diseases. Obesity needs to be

addressed in a comprehensive and continuous manner to reduce the prevalence among women. A health promotion campaign on Type 2 Diabetes, targeting women in rural Jamaica will impact cost associated with treatment and the incidence of diabetes.

According to Callender (2000), 50% of individuals with diabetes have a history of hypertension. In addition, people with Type 2 Diabetes are susceptible to heart disease, damage to other vital organs, and have a greater risk of amputations, renal disease, and visual problems. The loss of life is greater in developing countries from complications of diabetes. Health-care practitioners should implement regular foot and eye examinations and counseling regarding lifestyle changes (exercise, nutrition, and education) in treatment plans. Foot exams at every encounter may reduce amputations and checking for skin disease may reduce infections.

Although, health policies and health statistics related to Type 2 Diabetes have not changed in a great way since Dr. Cheryl Samuel conducted her survey among women and men in rural Jamaica (2005), many valuable studies and findings have identified improvements that can certainly make a difference in the prevalence of Type 2 Diabetes in Jamaica. In 1996, the prevalence of hypertension and diabetes was high among women age 20-59 years. Diabetes accounted for one of every nine deaths, and the rate of diabetes among women increased from 51.8 per 100,000 in 1990 to 59.9 per 100,000 in 1999. (Samuel, 2005)

Studies and observation have shown the merit of lifestyle changes. Health practitioners and their patients need to pay more attention to the management of Type 2 Diabetes and place more emphasis on the importance of weight reduction, dietary

measures, and exercise. More attention is needed in early detection, co-morbid factors and just physical checks including laboratory tests in making assessments of patients.

Several studies have indicated more patient education is needed and doctors need to communicate more effectively with their patients. Partnering with pharmacies, churches, schools, banks, and nursing students would be beneficial in public awareness of chronic diseases like diabetes to target women and their children in rural Jamaica. There is an abundance of nursing schools in Jamaica that hospitals could partner to reduce chronic diseases. Women have a higher prevalence of high cholesterol and obesity. Lower socioeconomic Jamaicans are more affected by chronic diseases and need to be reached with intervention and prevention information. It is reported by health-care professionals that patients are more likely not to comply with treatment regimes and exercise a low effort to implement lifestyle changes. The outreach strategies, involving communities, will help increase prevention and education of chronic diseases and will strengthen relationships between patients and their health-care providers.

Standards of nutrition and dietary habits must be established because of the close relationship of lifestyles to diseases and the quality of life. Individuals must be encouraged to develop healthier eating habits and to participate in physical activities. Other health problems other than diabetes are associated with heart disease, high blood pressure, high cholesterol, family history of diseases, and smoking. Nutrition and physical activity impacts of these diseases. These diseases can be controlled or avoided with healthy lifestyles. In Jamaica, low levels of carbohydrates, limited sugar-sweetened drinks, and balanced portions will help decrease the risk of Type 2 Diabetes. Raising public awareness through health promotion will create a healthier environment.

While conducting the questionnaire survey, I visited schools to survey administrators and teachers and I recognized sweets being sold at the school gates, as in Bourne et al. (2010) School administrators should be educated on chronic diseases and should be a partner in implementing policy and public health interventions.

Jamaica has taken a good step in developing strategies targeting the promotion of healthy lifestyles that will help to stop the rise in non-communicable diseases like diabetes (National Report of Jamaica on Millennium Development Goals for the UN Economic and Social Council, 2009, July). Practical guidance should be disseminated to ensure the policy is being implemented throughout the island and, as the report states, “to find culturally effective interventions that will lead to positive behavior change” (p. 18).

Diabetes education will empower patients and their families to manage the disease effectively with the skills received through training. Practitioners need to design treatment considering the needs of their patients. The National Institutes of Health states:

‘Patient-centered care is defined as ‘providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions.’ When informed patients take an active role in managing their diabetes, and providers are prepared, proactive, and supported with time and resources, their interaction is likely to be productive. This patient-centered interaction can lead to better diabetes care, more efficient and effective practices, healthier patients, and more satisfied patients and providers. The goal is to customize care to the specific needs and circumstance of each individual, that is, to modify the care to respond to the person, not the person to the care. Because patients are highly variable in their preferences, they and

their families need to be involved with the health care provider or health care team in diabetes management decision-making (National Institutes of Health, 2006).

Barriers to Healthcare

Several studies of the delivery of care for people with diabetes showed gaps in diabetes management at the public health and clinic levels. In addition, barriers to care were observed and shared by healthcare providers. More specifically, the Ministry of Health, public health clinics, and patients have identified specific barriers, which are listed in the following table:

Table 7. Stakeholder Barriers to Healthcare

Stakeholder Barriers to Healthcare		
Ministry of Health	Public Health & Clinics	Patients
Lack of guidelines and health policies to support prevention and medical care	Staff shortages (public health nurses, dieticians, social workers, pharmacists, health aides)	Long wait time
Lack of comprehensive health promotions	Shortage of equipment for testing and for examinations in health-care centers	Transportation difficulties
Lack of mobilization of community	Shortage of facilities	Lack of patient education
	Lack of continuing staff training	Failure to comply with medications
	Lack of training of health-care professionals	Lack of behavior modification (healthy diets and exercise)
	Inadequate working conditions	Difficulties in monitoring glucose, blood pressure, cholesterol
	Failure to provide emphasis on preventative services	Illiteracy
		Cultural mindset of acceptance of obesity and overweight
		Economic challenges to filling prescriptions

Chronic diseases must be adequately managed by healthcare professionals and their patients to decrease disability, impairment, mortality, and a reduction in healthcare costs.

Fast-food restaurants are plentiful in rural Jamaica. In May Pen, there are drive-in restaurants and a concentration of walk in restaurants. During my observations at lunch and dinner hours, patrons wait in long lines to consume these meals, which are basically fried foods and carbohydrates.

Most Jamaicans consumption of fruits and vegetables are far below recommended portions. From my observation, each meal has two to three carbohydrates and a very small portion of vegetables and fruits. Sweetened beverages and fruit punch are consumed daily and may contribute to an increase risk of Type 2 Diabetes because of weight gain. More processed meats are being consumed by eating carryout meals at Kentucky Chicken and other establishments. The portion sizes are more than enough for several people.

In Jamaica, there is a cultural acceptance of obesity especially in women. Fewer than half of the subjects recognized poor diet and/or overweight as contributing to their diabetes in a random study of 35 men and 98 women selected from a population of 510 patients attending Diabetes Specialist Clinic of the University Hospital of the West Indies (Went, Duff, McFarlane-Anderson, Bailey & Wright-Pascoe, 2006). Firmly rooted social and economic factors actively encourage overeating and sedentary behavior and discourage change. Indiscriminate eating patterns could have a direct and unfavorable influence on weight management and glycemic control. The lack of long term dental care could also affect dietary compliance.

The West Indian Medical Journal (2004) has reported a failure among health practitioners in Jamaica to aggressively treat diabetes. The journal states that 60% of patients are in poor glycemetic control and physicians seem reluctant to prescribe insulin therapy. In addition, the Pan American Health Organization (2006) has recommended strong leadership among ministries of health and advocates to effect reform of the health systems in the region.

The gaps of care delivery in treating diabetes need to be closed; trained nutritionists and dieticians are needed; national guidelines for the management of diabetes need to be implemented; high risk rural dwellers and women need to be targeted with health education on chronic diseases; and health promotions targeting healthy eating and exercising to increase awareness of chronic disease must be directed at high-risk populations. Prevention and intervention strategies need continuous evaluation. It is critical that insurance is provided in an equitable manner. Effective leadership at all levels is critical to improve primary health care. Interventions, such as, foot assessments at every visit must be implemented to avoid complications in patients treated for diabetes. Women must be encouraged to take action by keeping records of their weight, BMI, and healthy lifestyle habits. Conferences and workshops should be held in rural Jamaica to provide a platform for producing guidance on implementation of policies and programs targeting chronic diseases.

Future Research Suggestions

This research prompts several suggestions for future research: What will be the impact of improved public awareness on the prevalence of Type 2 Diabetes in rural Jamaican women? How can gaps in management of diabetes at the public health and clinic levels be reduced or eliminated? What are optimal guidelines and healthcare policies that would (1) support diabetes care and prevention; and (2) target all chronic diseases to improve concurrent risk factors?

APPENDICES

APPENDIX B

BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM

BRFSS QUESTIONS FOR 2010

Weight and height measurements without shoes?

___/___ ___=Height (ft/inches)

___/___ ___=Weight (lbs)

1. During the past month, other than your regular job, did you participate in any physical activities or exercise such as running, gardening, or walking for exercise?
1 ___ yes
2 ___ no
3 ___ Don't know/Not sure
2. When you are at work, which of the following best describes what you do?
Would you say:
1 ___ Mostly sitting or standing
2 ___ Mostly walking
3 ___ Mostly heavy labor or physically demanding work
4 ___ Don't know/Not sure
3. Do you smoke?
1= Yes
2= No
7= In the past
4. Is any of your immediate family (father, mother, sister, brother) diabetic?
1 ___ Yes
2 ___ No
3 ___ I don't know
5. Are you vegetarian (no meat)?
1 ___ yes
2 ___ No
3 ___ I don't know
6. Have you ever been told by a doctor that you have diabetes? (If "yes," ask "Was this only when you were pregnant?")
1 ___ yes
2 ___ no

- 3__ __ Don't know/Not sure
- 4__ __ female told only during pregnancy

7. Do you have High Blood Pressure?

- 1__ __ yes
- 2__ __ no
- 3__ __ Don't know/Not sure

8. About how many times in the past 24 months have you seen a doctor, nurse, or other health professional for routine health check-up?

- 1__ __ yes
- 2__ __ no
- 3__ __ more than 5
- 4__ __ Don't know/Not sure

9. Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans?

- 1__ __ yes
- 2__ __ no
- 3__ __ Don't know/Not sure

10. Have you ever had a class, course, or informed about the causes and prevention of diabetes by a doctor, nurse or health professional?

- 1__ __ yes
- 2__ __ no
- 3__ __ Don't know/Not sure

Demographics

11. What is your age?

- 1__ __ 18---25
- 2__ __ 26---35
- 3__ __ 36---45
- 4__ __ 46---55
- 5__ __ 55---65
- 6__ __ 65 and older

12. What is the highest grade or year of school you completed?

- 1=Never attended school or only attended kindergarten
- 2=Grades 1 through 8 (Elementary)
- 3=Grades 9 through 11 (Some high school)
- 4=Grade 12 or GED (High school graduate)
- 5=College 1 year to 3 years (Some college or technical school)
- 6=College 4 years or more (College graduate)
- 7=Refused

13. Are you currently:
 1=Employed for wages
 2=Self-employed
 3=Out of work for more than 1 year
 4=Out of work for less than 1 year
 5=Homemaker
 6=Student
 7=Retired
 8=Unable to work
 9=Refused
14. What is your Annual household income from all sources (Jamaican currency)
 1__ __ Less than \$40,000
 2__ __ \$40,000--79,999
 3__ __ \$80,000—299,999
 4__ __ \$310,000—499,999
 5__ __ \$500,000—999,999
 6__ __ \$1,000,000—1,499,999
 7__ __ \$1.5 million—2,999,999
 8__ __ \$3 million and over
15. Are you (marital status)
 1=Married
 2=Divorced
 3=Widowed
 4=Separated
 5=Never married
 6=A member of an unmarried couple
16. Which one or more of the following would you say is your race?
 1=White
 2=Black
 3=Chinese
 4=Indian
 5=Other: (specify) _____
17. What is your religion?
 1=Seventh Day Adventist
 2=Protestant
 3=Catholic
 4=Rastafarian
 5=Other: (specify) _____

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