

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody
Adams Clinic at the Baxter Institute

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(ABSTRACT)

The purpose of this study was to determine the prevalence of known risk factors associated with diabetes among James Moody Adams (JMA) clinic patients in order to develop and test educational material and clinical interventions to reduce the incidence of pre-diabetes and uncontrolled Type II Diabetes. The research objectives for this study focused on: 1. prevalence of Type II Diabetic patients at the Clinic; 2. pre- and post-test knowledge level of patients regarding their Type II Diabetes; 3. relationship between dependent variables (body mass index [BMI], blood glucose level, blood pressure, waist circumference, level of tobacco use, and level of depression) and the independent variables (age, gender, family history of diabetes, socio-demographical data [education level, level of income], literacy, and exercise regimen, medication, and diabetes knowledge); 4. effectiveness of a nutritional and lifestyle modification intervention program to control Type II Diabetes. Two hypotheses tests: 1. decrease blood glucose levels of Type II Diabetes Mellitus patients; 2. decrease weight by 5 percent among pre-diabetic and Type II Diabetes Mellitus patients. A follow-up survey determined participant's reflection on key dimensions of the study and impact of unforeseen political unrest that occurred during this study. The methodology was a case study with clinical and educational intervention across a 6 months. The population included patients presenting at the JMA clinic at onset of the study; an initial sample of 96 reduced to 48 due in part to political unrest was still within power test specification. Instrumentation include researcher developed,

standard of care clinical practice and standardized forms. Analyses utilized descriptive statistics and t-test. Significant gain was determined for diabetic knowledge ($p < 0.001$); and significant decrease in Type II Diabetic blood glucose with $p = 0.031$. An important conclusion is that implementing a Type II Diabetic prevention program is feasible and effective in this study. Future recommendations include replication of the study and implementation of protocols and education that were successful in this study.

Dedication

I would like to thank my family and friends for always being there when I needed assistance or support in this journey. I would also like to thank Crystal Wingfield for all her support and encouragement towards my finishing this thesis. Finally, I would also like to give a special thanks and dedication to my parents, Olivia and Manuel C. Magalhães, and my sister, Erica Gibson, for always being there and supporting me throughout this long journey that is life.

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Chapter One

Introduction

Type II Diabetes Mellitus is among the most pressing health issues in Honduras where the medical health care system lacks capacity to address prevention, detection and treatment. If research could be conducted to develop preventative measures, the demand for doctor services and medications for Diabetic treatment could be reduced while concurrently improving the welfare of the citizens of Honduras. This study used a sampling unit in a safe secure VCOM clinic where there is already agreement from the Ministry of Health and all related sectors for research, clinical activities and education. The VCOM Institutional Review Board and Honduran approval for this research were completed following graduate committee approval of the preliminary examination. Chapter 1 provides the background and setting for the research followed by related literature review in Chapter 2, research methods in Chapter 3, findings in Chapter 4 and discussion in Chapter 5.

Honduras Fast Facts

In order to consider the context for this study on Type II Diabetes it is important to understand the government, medical system, culture and many other aspects in this small Central American country. The historical background has important contextual factors that relate to the people, culture and contributing environmental factors which relate to health.

Honduras is a democratic nation that is located in Central America as portrayed in Figure 1. It is bordered by Guatemala to the west, by El Salvador to the southwest, and by Nicaragua to the southeast. Honduras is also bordered by both the Gulf of Honduras (the Caribbean Sea) to the

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north and the Gulf of Fonseca (the North Pacific Ocean) to the south. The landscape of Honduras is primarily mountainous interiorly with narrow coastal plains (Central Intelligence Agency: The World Factbook [CIA WFB], 2009). Honduras has a total area of 112,492 square kilometers which is comparatively slightly larger than the state of Tennessee (CIA WFB, 2009).

The estimated population size of Honduras is just over 7.6 million (CIA WFB.2009); and the capital city is Tegucigalpa with a population size estimated to be over 1.7 million (Edward Via Virginia College of Osteopathic Medicine [VCOM], 2009). The median age of Hondurans is 20 years – males 19.7 and females 20.4 years (CIA WFB, 2009). The country is currently divided into 18 departments, which are headed by President appointed governors. Figure 2 shows the 18 departments of Honduras. Ethnically 90 percent of Hondurans are Mestizo, which is a mix Amerindian and European; and the major religion is Roman Catholic (CIA WFB, 2009).

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Figure 1: Location of Honduras in Central America



Figure 2: Map depicting the 18 Departments of Honduras

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Background History

Honduras was first inhabited by indigenous people, most notably the Mayans and Lencas (United States of America Department of State [USADS], 2009). It was not until 1502 and the discovery of the Americas by Christopher Columbus that Honduras gained its name, which means “depths” and was named for the territories deep coastal waters (“History of Honduras”, 2009). In 1537 the Spanish conquistadores battled and drove out a resistant united indigenous people (USADS & Encyclopedia of the Nations [EN], 2009, 2008). These people were made up of 200 various tribes and were led by Lempira, a renowned warrior and Lencas’ chief. Today “Lempira” is commemorated in much the similar way that George Washington is in the United States; not only is the current Honduran currency named after this great chief, but his image can be found on the one-Lempira bill.

On the 15th of September 1821 Honduras along with Guatemala, El Salvador, Nicaragua, and Costa Rica jointly declared their independence from the Spanish empire. Today, Honduras celebrates September 15th as their National Independence Day Holliday (G. Chandler, L. Prado & USADS & EN, 2007, 2009, 2008). In 1823 Honduras declared their freedom from Mexico and helped form the United Provinces of Central America federation. It was not until the fall of the Federation in 1838 that Honduras again declared its independence and finally became its own nation (Encyclopedia Britannica & EN & USADS, 2009, 2008, 2009).

Over the centuries Honduras like most nations have faced wars, civil unrest, and had its own “golden age”. In addition, Honduras has faced and overcome its own natural disasters, none greater than *Hurricane Mitch*. It has been reported that this Category 5 storm “will forever be remembered” as one the deadliest and most powerful hurricanes to strike the Western

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Hemisphere (National Climatic Data Center [NCDC] & G. Chandler, et al., 2009, 2007). Figure 3 portrays Hurricane Mitch's path through Central America.

In October of 1998 the slow moving storm known as Hurricane Mitch hit and devastated Central America, with Honduras taking the heaviest blow. Peak sustained winds were recorded at 180 mph with gusts over 200 mph and rainfall estimates as high as 75 inches were reported to have fallen which lead to floods and mudslides across the country (NCDC & G. Chandler, et al., 2009, 2007). Consequently, 25 small villages were wiped away, and an estimated 6,500 people were reported dead with several thousand missing. Approximately 20 percent of the country's population or 1.5 million Hondurans were left homeless (NCDC, 2009). At least 70 percent of crops were destroyed; and an estimated 70-80 percent of Honduras' transportation infrastructure was wiped out (NCDC & G. Chandler, et al., 2009, 2007). Damage was estimated to be around 4 billion dollars. As a result of this massive and widespread damage the Honduran President at the time, Carlos Roberto Flores Facussé, claimed it had destroyed fifty years of progress.

According to the CIA World Fact book, Honduras is currently the second poorest country in Central America and one of the poorest countries in the Western Hemisphere. The country's population is estimated to be just over 7.6 million people; with a median age of 20 years – males 19.7 and females 20.4 years (CIA WFB, 2009). AmeriCares reported that 35 percent of the population lives on less than \$2 a day, and an estimated 80 percent of the population is uninsured. As a result of many circumstances associated with poverty and environmental conditions, health care is a major challenge. Therefore, there are many medical missions, mission trips and benevolent health care activities in Honduras aimed to help solve these overwhelming health care issues in which the government cannot fully address.

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Figure 3: Depiction of Hurricane Mitch's Path

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Influence of the James Moody Adams Clinic

The James Moody Adams (JMA) Clinic which began in 1984 is one of the early modern-day pioneering efforts to address poverty and health in Honduras. The Adams family purchased the land on which the clinic had been renting and on October 17, 1991 it was inaugurated in honor of the Adams family. The JMA Clinic houses both a medical and dental clinic, and is staffed by a full-time medical team which consists of a doctor, dentist, nurses and pharmacist. The clinic offers medical and dental care to the Baxter Institute's staff and students, as well as to those impoverished people in the surrounding area of Tegucigalpa (Association Amicus, 2009b). The clinic is jointly supported by the Baxter Institute and the Edward Via Virginia College of Osteopathic Medicine (VCOM), and provides free medical care to an estimated 40 patients per day. The current diabetic population at the JMA clinic is approximately 60 patients with new cases diagnosed daily. The JMA clinic resides in a secure compound of approximately 13 acres. The campus is shared between the medical and related care facilities and the Baxter Institute.

The mission of the JMA clinic, in parallel with the global health activities of VCOM make the clinic an ideal location for this proposed research on Type II Diabetes. It was believed that the clinic facilities, staff and in-country agreements would provide the most optimal setting for a successful study, implementation of finding and long-term sustainable effort one would hope results from dissertation research in a third-world setting.

The Baxter Institute of Biblical & Cultural Studies

The Baxter Institute originated in Mexico in 1964. Then in 1978 the Institute moved to its current location on the southwest side of the capital city, Tegucigalpa, Honduras (Association Amicus, 2009a). The Institute was chosen for its prime location and accessibility to the

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surrounding countries in which it aims to serve. The primary mission of the Institute as stated on their website is “to recruit, train and graduate highly-trained gospel preachers to serve Latin American countries” (Association Amicus, 2009a). The JMA clinic provides medical care to the faculty, staff and students. In addition, it provides compassionate health care to the poorest individuals within Tegucigalpa and surrounding region where patients arrive by bus and other means of transportation.

VCOM and JMA and Baxter Institute Forge Partnership

The Baxter Institute and the JMA clinic are dedicated to improving the quality of life and in particular the work of the JMA clinic is devoted to health. Due to financial and staff limitation along with the pressing needs, it became increasingly difficult to meet all the health care issues. Concurrently, VCOM was looking for a health care partner in the region in order to meet the school goals of benevolent care, mission medicine along with education of students and research. After much discussion and site visits, an agreement was signed between VCOM, the JMA clinic and the Baxter Institute in 2005. This agreement specified that VCOM would take the lead role in medicine and Baxter would build on their primary goal of preparing ministers along with community development.

Since 2005 VCOM and the Baxter Institute have worked jointly on medical care for the people of Honduras leading to an understanding of pressing health care needs in the region. One such need is diabetes where there are chronic cases presenting at the clinic on a routine basis.

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Diabetes in Honduras

Diabetes mellitus is a problem in Honduras and around the world. The World Health Organization estimates that more than 220 million people worldwide have diabetes and predicts that this number will more than double by the year 2030 (2011). Worldwide, more than 80 percent of all deaths from Diabetes occur in the low- and middle-income countries, like Honduras. Again, Honduras has an estimated population of 7.6 million, and an estimated annual per capita income of \$1,540. More than 50.7 percent of the population lives below the poverty line. Many of those living in poverty turn to high caloric, high fat and high sugar foods to satisfy their hunger. Poverty and related factors have led to a tremendous increase in Diabetes within Honduras and worldwide, which may only worsen as food prices continue to rise and people begin to turn to less expensive, and often less nutritious options.

Dr. Daniel Einhorn, MD, FACP, a spokesman for the American Association of Clinical Endocrinologists, stated that uncontrolled Type II Diabetes Mellitus is now the leading cause of new cases of blindness in adults under the age of 75, the leading cause of kidney failure and the cause for more than 60 percent of non-injury foot amputation cases (Boyles, 2007). Diabetics also have a 200 percent greater chance of death compared to those individuals without the condition of a similar age.

Diabetes mellitus is a tremendous health concern that can lead to life-threatening complications if not properly controlled. In Honduras, there is a high prevalence of uncontrolled Type II Diabetes Mellitus cases among patients visiting the James Moody Adams Clinic. Furthermore, while patients may be counseled about the potential consequences of their uncontrolled diabetes and receive treatment, many patients simply do not adhere to their treatment guidelines.

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Research has shown the validity and efficacy of lifestyle modification in the prevention of Type II Diabetes. However, implementation has been shown to vary in different ethnic societies. The International Diabetes Federation along with the United States Diabetes Prevention Program both acknowledge this and recommend a need for ethnic-specific screening (Alberti, Zimmet, Shaw & Diabetes Prevention Program Research Group [DPP RG], 2007, 2002). Furthermore, as Dr. David W. Dunstan and his team of investigators stated the “U.S. is the only country in the developed world with reliable data” (2002). While there is much known about diabetes, the problem is pervasive, and thus creating a substantial drain on governmental health budgets and representing a challenge for medical professional staffs to meet the needs of its patients. Therefore, could preventative measures adopted by the population and early treatment protocols help to reduce the risks associated with, improve the treatment of, and ultimately help patients to avoid the most devastating complications of Diabetes? This research sought to explore this question through a carefully designed study of an accessible population where the researcher already had experience and other conditions presented a place for the study to be conducted.

Problem Statement

Currently there are a high number of patients who are overweight and thereby would fall into the category of pre-diabetic at the James Moody Adams Clinic. In addition the patients who already present with diabetes at the JMA clinic often do not adhere to their treatment guidelines and fail to change their lifestyle in order to better control this non-communicable, potentially life-threatening disease. Much of this can be contributed to the lack of knowledge among patients in this region concerning diabetes mellitus.

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Purpose

The purpose of this study was to determine the prevalence of known risk factors associated with diabetes among JMA clinic patients in order to develop and test educational material and clinical interventions to reduce the incidence of pre-diabetes and uncontrolled Type II Diabetes.

Research Objectives

The objectives of this research were:

1. Determine the prevalence of Type II Diabetic patients who present at the James Moody Adams Clinic in Tegucigalpa, Honduras.
2. Determine the knowledge level of patients regarding their Type II Diabetes, via a pre- and post-test.
3. Determine and describe the relationship between the dependent variables (body mass index [BMI], blood glucose level, blood pressure, waist circumference, level of tobacco use, and level of depression) and the independent variables (age, gender, family history of diabetes, socio-demographical data [education level, level of income], literacy, and exercise regimen, medication, and diabetes knowledge).
4. Evaluate the effectiveness of the researcher-developed protocol for a nutritional and lifestyle modification intervention program to control Type II Diabetes.

There are two primary hypotheses guiding the research:

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Hypothesis 1: A researcher developed protocol of nutritional and lifestyle modification intervention will decrease patient glucose levels among Type II Diabetes Mellitus patients presenting at the JMA clinic during the treatment period.

Hypothesis 2: A researcher developed protocol of nutritional and lifestyle modification intervention will decrease weight by 5 percent among pre-diabetic and Type II Diabetes Mellitus patients presenting at the JMA clinic by the end of the treatment period.

Limitations

The findings of this study were limited to the indigent patient population of the JMA clinic. These patients came from the surrounding area and consisted of mainly low-skilled workers who rely on benevolent clinics for their primary health care. These people represented the 50.7 percent of Hondurans who live under the poverty line. With regards to this study there was no absolute control over patients because the interventions occurred in a naturalistic environment in the course of normal daily activities of the patients. Ethical and moral implications were embedded in the patient lifestyle and thus a factor in any outcome of modifications and medication in this study. As such there were limitations to implementing and monitoring patient adherence to the study protocols. Therefore, these limitations should be considered in generalizing the findings of this study to other settings.

The principal investigator was responsible for the initial onsite screening of patients and training of the JMA clinic medical staff for the purposes of implementing the developed protocols which included educational lesson plans along with an exercise regimen. While Spanish-English translators were available within the clinic, communication breakdowns between the provider and patient were possible. Therefore, inadequate communication between

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the health care provider and participant may have positively or negatively affected the participants understanding and development within the study. To control for this potential limitation, the principal investigator relied on the expertise and researcher-trained staff and physician of the JMA clinic in implementing the researcher developed protocol and data gathering techniques.

Other possible threats to the internal validity of this study were: 1) Testing; patients were measured several times on the same variables, therefore their performance may have been affected due to practice, memory of earlier responses, sensitization and/or conjecture regarding the purpose of this research and expectations of the researcher. 2) Maturation; may have also threaten the internal validity of this study due to passage of time.

Additionally this study was limited by time. This study was initially to be conducted over a 6 month time frame which the literature has shown as minimum to determine significant findings in the prevention and decrease risk of diabetic incidence. However, due to unforeseen circumstances the study was required to be extended an additional month. This study followed the recommendations of both the World Health Organization and the International Diabetes Federation in the treatment and prevention of Type II Diabetes Mellitus as a control for the limitation of time. The health and safety of the patients were paramount throughout the duration of this study.

Finally this study was limited by history. On June 24, 2009 the primary investigator became aware of unexpected political situations which led to unforeseen circumstances. These unforeseen circumstances led to a reduction in anticipated participation in the IRB approved research. These circumstances required approval from IRB to alter the original methodology of the study. A historical timeline of events can be found in Appendix A. On the 28th of June the

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President of Honduras was removed from office through court and military intervention which resulted in mass demonstrations, curfews and related political unrest in Honduras. Ensuing public concern over safe travel, curfews and related events reduced the participation from 96 pre-enrolled to an average participation rate of 25.15 for data collection points (See Appendix B for Data Collection Point Attendance Numbers).

Significance of the Study

Based on the review of literature, this study adds to the growing literature concerning Type II Diabetes Mellitus. Moreover, this study adds to the understanding about cultural influences and risk factors associated with pre-diabetes and Type II Diabetes Mellitus in Honduras. As already stated in this chapter, there is a need for ethnic-specific screening and lifestyle modification protocols (Alberti, Zimmet, et al, 2007) which this study will address in Chapter 5 of this dissertation. Furthermore, the data gathered in this study provides a base for further investigations concerning diabetes mellitus in Honduras. Finally, the results of this study could enable the JMA clinic to establish and develop their own Diabetic Clinic prevention, detection and treatment center.

Definition of the Terms

- *Glucose*: is a monosaccharide, or simple sugar. It is also an important source of energy for the body's cells. This simple sugar is made in the body from proteins, fats, and carbohydrates carbohydrate that the human body utilizes as a source of energy and metabolic intermediate (MedicineNet.com, 2009).

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- *Hyperglycemia*: Abnormally high levels of glucose in the blood. (“Hyperglycemia,” 2009).
- *Diabetic Ketoacidosis (DKA)*: results from low levels of insulin in the body, causing blood sugar levels to rise and accumulation of ketones. If left untreated DKA may lead to losing consciousness or death (MayoClinic.com, 2009).
- *Pre-diabetes*: condition in which an individual’s blood sugar level is higher than normal, but not high enough to be classified as Type II Diabetic (MayoClinic.com, 2009).
- *Body Mass Index (BMI)*: is numerical value calculated from an individual’s height and weight. “BMI provides a reliable indicator of body fatness for most people and is used to screen for weight categories that may lead to health problems” (“Body Mass Index,” 2009).
- *Latino*: a person of Latin-American or Spanish-speaking descent (Dictionary.com, 2009).

Chapter Two

Review of Literature

Diabetes

Diabetes mellitus is a chronic non-communicable disease and is one of the leading metabolic diseases (The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus [Expert Committee DM], 2002). The hallmark of diabetes mellitus is the presence of elevated blood glucose levels. This hyperglycemia is often due to some dysfunction in insulin. Insulin is a hormone produced by the pancreas that controls sugar levels in the blood. Diabetes mellitus is often times manifested by a lack of insulin production, a resistance to the insulin itself or in some instances both a lack in production and resistance may occur (Expert Committee DM, 2002). There are three primary forms of diabetes mellitus:

- 1) *Type I Diabetes mellitus* (previously known as insulin-dependent or childhood-onset diabetes) – Due to absolute insulin insufficiency production by pancreatic beta cells. (American Diabetes Association [ADA] & Schneider, Szanto & Koetke, Doyle, 2008, 2006, 2005).
- 2) *Type II Diabetes Mellitus* (previously known as non-insulin-dependent diabetes) – Insulin resistance with varying degrees of insulin secretory defects (ADA & Munden, 2008, 2006).
- 3) *Gestational diabetes mellitus* – Diabetes that emerges during pregnancy (ADA & Munden, 2008, 2006).

Of these three forms of diabetes mellitus, research has shown that Type II Diabetes Mellitus is the most prevalent form (Schneider, Szanto & Expert Committee DM, 2006, 2002) –

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accounting for 85-90 percent of all diabetes cases worldwide (Dunstan, Zimmet, Slade, Harper, Burke, 2003). Therefore, it is important to understand this type and how it is different from Type I Diabetes.

Type I Diabetes Mellitus is characteristically diagnosed early in life typically before age 30 (Beers, Berkow, 1999). Furthermore, Type I Diabetics are more inclined to fall into diabetic ketoacidosis (Beers, Berkow & Goroll, Mulley, Jr. ed., 1999, 2000). Type II Diabetes Mellitus is characteristically diagnosed later in life typically after age 30 (Beers, Berkow & Schneider, Szanto, 1999, 2006). Type II Diabetes Mellitus is also most often associated with a mild to moderate degree of obesity (Schneider, Szanto, 2006). Obesity is believed to play a major role in the insulin resistance associated with Type II Diabetes (Goroll, Mulley, Jr., 2000).

Risk Factors associated with Type II Diabetes Mellitus

Research has shown that Type II Diabetes results from exposure to environmental risk factors in individuals who are genetically predisposed (Lindström, Eriksson, Valle, Aunola, et al., 2003). These environmental risk factors are known as modifiable risk factors; and the more influential of these risk factors are overweight, abdominal obesity and level of physical inactivity (Alberti, Zimmet, et al. & Stumvoll, Goldstein, Van Haeften, 2007, 2005). Furthermore, there are non-modifiable risk factors which have also been shown to play a role in identifying at risk individuals. These risk factors include ethnicity, a positive family history of Type II Diabetes, age, gender, and history of gestational diabetes (Alberti, Zimmet, et al., 2007). Unfortunately, Type II Diabetes is under diagnosed and is most often discovered after complications have arisen in affected individuals (ADA, 2008).

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People associated with Type II Diabetes have been shown to have poor lifestyle habits (i.e., poor eating and physical activity habits) which lead to their diabetic issues (“Lifestyle and nutritional management”, 2006). For this reason, it is important to understand the risk factors associated with Type II Diabetes and the proper screening tests for this disease. Studies which will be discussed in further detail later in this chapter have also been conducted and shown to support the importance of lifestyle modification in the prevention of type II diabetes mellitus.

The most significant modifiable risk factor associated with the development of Type II Diabetes is *obesity* (Pittas & Alberti, Zimmet, et al., 2003, 2007). The World Health Organization has estimated that there are currently 1.1 billion people who are classified as being overweight and they expect that number to rise to over 1.5 billion by 2015 (Alberti, Zimmet, et al., 2007). The degree of overweight or obesity can be determined by a person’s BMI. The prevalence of Type II Diabetes in obese adults is 3-7 times higher than in healthy weight adults, and those with BMI > 30 have been shown to have a 20 times greater risk of developing diabetes than those individuals in a healthy BMI range of 18.5-24.9 (Klein, Sheard, Pi-Sunyer, Daly, et al., 2004).

However, there are individuals who are not obese by traditional BMI criteria but have an increased percentage of body fat distribution predominately in their abdominal region (Expert Committee DM, 2002). Consequently, cohort studies have been conducted to determine which is the best predictor of Type II Diabetes – BMI or waist circumference. The overall findings of these studies have indicated that waist circumference is not only a better predictor of Type II Diabetes but it is the preferred measurement (Wang, Rimm, Stampfer, Willett, et al. & The Diabetes Prevention Program Research Group, 2005, 2006).

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The World Health Organization has indicated that one of the primary reasons for the increasing levels of obesity worldwide is due to the decreasing levels of physical activity (World Health Organization [WHO] & Alberti, Zimmet, et al, 2009, 2007). In addition, physical inactivity has been shown through recent studies to be an independent predictor of Type II Diabetes (Alberti, Zimmet, et al., 2007). Thus level of physical activity is another important modifiable risk factor associated with Type II Diabetes Mellitus. Researchers have stated that the decline in physical activity over recent decades can be attributed to the urbanization of many populations (Mohan, Pradeepa & Alberti, Zimmet, et al., 2007, 2007).

In addition to these known risk factors, it is important to remember that Type II Diabetes typically has a slow and insidious onset; which means that many individuals are asymptomatic. Therefore, it is important to recognize the potential signs and symptoms (see Appendix C); and testing should be done on all asymptomatic adult individuals that meet the criteria for pre-diabetes and diabetes. In the *Standards of Medical Care in Diabetes – 2008* the American Diabetes Association set forth criteria for such testing (See Appendix D). Utilizing this criterion anyone older than 45 years should be tested and in the case of this study any Honduran with a high body mass index ($BMI \geq 25$) would qualify for testing since they already are Latino – one of the additional risk factors.

Complications of Type II Diabetes Mellitus

Complications of Type II Diabetes Mellitus are microvascular, macrovascular, and behavioral in nature. The degree of diabetic complications varies from person to person but correlate typically with the magnitude and duration of hyperglycemia. Studies have shown that of the known diabetic complications, cardiovascular disease is the leading cause of morbidity

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and mortality – approximately 75-80 percent (Alberti, Zimmet, et al. & ADA, 2007, 2008).

Furthermore, this macrovascular complication has also been shown to be the largest contributor to the direct and indirect costs of diabetes (ADA, 2008). Another major complication of diabetes is diabetic nephropathy, a microvascular disorder and one of the leading causes of end-stage renal failure in adults (Goroll, Mulley, Jr., 2000).

Other complications associated with diabetes mellitus are:

1. Stroke.
2. Retinopathy – a microvascular disease that over time has been shown to have 75-85 percent prevalence (Goroll, Mulley, Jr., 2000).
3. Neuropathy – may lead to peripheral sensory deficit and autonomic neuropathy; polyneuropathy has been shown to lead to foot and other infections which may lead to osteomyelitis, which would then require amputation (Goroll, Mulley, Jr. & Beers, Berkow, 2000, 1999).
4. Dyslipidemia.
5. Diabetic ketoacidosis – more common with Type I Diabetics (Beers, Berkow, 1999).
6. Hyperosmolar hyperglycemic nonketotic syndrome – more common with Type II Diabetics which can lead to impaired consciousness (Beers, Berkow, 1999).

Research has shown that these complications can be prevented through proper screening and health care management. The American Diabetes Association provides recommendations for the prevention and management of diabetic complications. Screening for hypertension and control of blood pressure should be conducted to help in the prevention of cardiovascular disease risk. The goal for diabetic blood pressure should be less than 130/80 mmHg (2008). In addition,

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lipids (HDL > 40 mg/dl for men and > 50 mg/dl in women) and triglycerides (< 150 mg/dl) should be monitored and maintained (2008).

Smoking cessation should also be encouraged to diabetic patients since studies have shown diabetics who smoke have a greater risk of cardiovascular disease and premature death (ADA & Goroll, Mulley, Jr., 2008, 2000). Annual eye exams should be conducted in order to prevent and manage any potential retinopathies. Foot care and screenings should be conducted annually as well in order to decrease the risk of infections and potential amputations. Overall, the American Diabetes Association and the International Diabetes Federation both recommend education and optimization of glucose and blood pressure control as the primary form of prevention of potential diabetic complications (ADA & Alberti, Zimmet, et al, 2008, 2007).

Significance of Lifestyle Modification on the Prevention of Type II Diabetes

Current literature concerning diabetes mellitus and the treatment of and prevention revolves around lifestyle modification and medical intervention – primarily with the use of the drug, metformin (Malmö Study, the Da Qing Study, the Finnish Diabetes Prevention Study, the United States Diabetes Prevention Program, and the Indian Diabetes Prevention Programme). Of these studies, the two most important to this proposed research in understanding of Type II Diabetic Prevention and Management are the Finnish Diabetes Prevention Study and the US Diabetes Prevention Program. Both of these studies demonstrated that lifestyle modification can help prevent the onset of Type II Diabetes Mellitus and have implications for management and control of Type II Diabetes Mellitus.

The *Malmö Study* was one of the earliest studies conducted. The goal of this study was to determine the effectiveness of lifestyle modification on the prevention of Type II Diabetes.

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However, the study was conducted only on men aged 47-49 years in Malmö, Sweden (Alberti, Zimmet, et al., 2007). Nevertheless, the study demonstrated that the men in the lifestyle intervention group had a lower incidence of Type II Diabetes compared to the control group (Alberti, Zimmet, et al., 2007). Therefore, albeit limited in its generalization, the *Malmö Study* supports the theory of using lifestyle modification in the prevention of Type II Diabetes.

The next study to aid credence to the theory of lifestyle modification was the *Da Qing Study*. This study was conducted over a six year period and was a randomized, controlled trial that included 33 clinics which were randomly allocated to different study conditions: control, diet, exercise or diet plus exercise (Centers for Disease Control and Prevention Primary Prevention Working Group [CDC WG] & Alberti, Zimmet, et al., 2004, 2007). This study demonstrated decreases in Type II Diabetes incidence amongst the three intervention groups – 31 percent reduction in diet group, 46 percent reduction in exercise group, and a 42 percent reduction in the combined intervention group (Alberti, Zimmet, et al. & CDC WG, 2007, 2004).

The Indian Diabetes Prevention Programme (IDPP) was a prospective community-based study focused on the whether progression to diabetes could be influenced by interventions in Asian Indians (Alberti, Zimmet, et al., 2007). This study demonstrated that lifestyle modification and metformin use could both significantly reduce the incidence of diabetes. No added benefit from combining the two strategies – lifestyle modification and metformin (Alberti, Zimmet, et al., 2007) were determined. The significance of this study is that it demonstrated medical intervention and lifestyle modification are not needed in combination in order to prevent diabetes.

The Finnish Diabetes Prevention Study (DPS) was the first randomized controlled clinical trial conducted which tested the feasibility and efficacy of lifestyle modification in high-

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risk subjects (Lindström, Eriksson, et al., 2003). The DPS randomly assigned 522 middle-aged, overweight subjects with impaired glucose tolerance to either a lifestyle intervention or to a control group. Individuals in the intervention group received individualized counseling which was aimed at educating the individual in hopes of reducing their weight and intake of total and saturated fat, as well as increasing their fiber intake along with increasing their physical activity. Overall, the DPS study provided evidence that Type II Diabetes Mellitus can be prevented by lifestyle intervention – as the incidence of Type II Diabetes was reduced by 58 percent – in middle-aged high-risk men and women (Lindström, Eriksson, et al. & Pittas & Alberti, Zimmet, et al., 2003, 2003, 2007).

The *United States Diabetes Prevention Program* (DPP) was the largest multi-centered randomized controlled trials to date that examined whether intervention with lifestyle modifications or metformin would prevent the development of clinical diabetes in high-risk subjects (Pittas & Alberti, Zimmet, et al. & Molitch, Fujimoto, Hamman, Knowler, 2003, 2007, 2003). The DPP randomly assigned 3,234 non-diabetic persons with elevated fasting and post-load plasma glucose concentrations to a placebo, metformin, or lifestyle modification program group (DPP RG, 2002). The DPP also set and achieved its goals of achieving at least a 7 percent decrease in weight and at least 150 minutes of physical activity per week. Overall, the DPP study also demonstrated a significant decrease in the incidence of Type II Diabetes Mellitus, 58 percent reduction, as compared to the metformin group that only showed a 31 percent decline in incidence (DPP RG & Pittas & Alberti, Zimmet et al., 2002, 2003, 2007).

Both the DPS and the DPP demonstrated that reduction and prevention of diabetes was most pronounced in those individuals who made multiple lifestyle changes and reached most of their lifestyle targets (Lindström, Eriksson, et al. & DPP RG & Alberti, Zimmet, et al., 2003,

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2002, 2007). Additionally, both studies demonstrated a greater efficacy in preventing Type II Diabetes amongst older individuals. This finding is significant since studies have shown that “the prevalence and incidence of type 2 diabetes increases dramatically as a function of age” (Crandall, Schade, Ma, Fujimoto, et. al., 2006). Moreover, the risk of dying from diabetes in the elderly population is greater than the sum of all infectious disease, accidents and other external causes (Peláez, Vega, 2006). Therefore, this helps to explain why age is a prominent risk factor associated with Type II Diabetes Mellitus.

Overall these five studies contributed to the understanding of Type II Diabetes Mellitus and variables which are most promising to investigate in this study. They have also added great insight into the understanding of how to combat this potentially life-threatening disease. The methodology used in these studies has allowed organizations such as the International Diabetes Federation and the World Health Organization to create Diabetic Management and Prevention Protocols. The general consensus of these studies are that Type II Diabetes can be prevented and can be managed quite well through a simple regimen of diet and exercise. For this researcher proposed research, the two most influential studies with respect to understanding and prevention of Type II Diabetes Mellitus are the Finnish Diabetes Prevention Study and the U.S. Diabetes Prevention Program. Nevertheless, as discussed in chapter one both the DPP and the International Diabetes Federation acknowledge these interventions work in some societies they may not work others. They suggest a need for more ethnic-specific studies and strategies (DPP RG & Alberti, Zimmet, et al., 2002, 2007) which is high relevance for this proposed research.

Depression and Diabetes

Another important finding in the review of literature concerning Type II Diabetes is the strong association that depression has with Type II Diabetes (Engum, Mykletun, Midthjell, Holen, Dahl & Anderson, Freedland, Clouse, Lustman & Nichols, Brown, 2005, 2001, 2003). A meta-analysis of 27 cross-sectional studies found that the presence of diabetes was associated with depression, and that those patients had a two times greater risk of diabetic complications (Anderson, Freedland, et al., 2001). Furthermore, the study claims that diabetics are twice as likely to be depressed than non-diabetic individuals in similar settings.

Additional studies have demonstrated that more than 25 percent of diabetic patients are clinically depressed; and that female diabetics have the highest rate of clinically diagnosed depression (Fisher, Chesla, Mullan, Skaff, Kanter & Katon, Rutter, Simon, Lin, Ludman, et al. & Engum, Mykletun, et al. & Nichols, Brown, 2001, 2005, 2005, 2003). Several studies have demonstrated that patients treated for depression had better diabetic knowledge, improved self-care behavior, improved clinical outcomes, lower self-reported weight, and improved quality of life (ADA, 2008). Consequently, organizations such as the American Diabetes Association and the International Diabetes Federation recommend some form of behavioral modification and treatment which has been shown to be important to the overall care of diabetic patients (Anderson, Freedland, et al. & ADA & Alberti, Zimmet, et al., 2001, 2008, 2007).

As indicated in this section depression and diabetes have been shown to be interrelated. Researchers are not exactly sure of which comes first – does depression lead to diabetes, or does diabetes lead to depression. Nevertheless, the rate of diabetes has been shown to be greater in depressed individuals (Anderson, Freedland, et al., 2001). Additionally, literature suggests that treating a patient's depression will ultimately have positive effects on their overall outcome and

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thereby assist in the prevention of and management of their diabetes (ADA, 2008). One thing that the studies listed in the previous section, *Significance of Lifestyle Modification on the Prevention of Type II Diabetes*, did not thoroughly describe or investigate was the influence of depression on diabetic outcome. Those studies simply reported the factors related to Type II Diabetes and how the rate of diabetes was affected by their respective prevention protocols. Therefore, for the purposes of this study the level of depression will be measured and recorded on a bi-monthly interval in order to determine what changes if any education and lifestyle modification have on the level of depression in diabetic patients in Honduras.

For the purposes of this research, a short self-reported depression scale will be utilized to measure, if present, the degree of each participant's depressed mood. The scale employed in this study is the Center for Epidemiologic Studies Depression scale (CES-D). Additionally this scale has been translated into Spanish for the participants in Honduras. The CES-D is a 20 question self-reported scale which is designed to measure the depressive symptomatology in the general population. This scale is not intended for clinical diagnosis. Research has concluded that the CES-D has a high internal consistency, acceptable test-retest stability, excellent concurrent validity by clinical and self-report criteria, and substantial evidence of construct validity (Radloff & Beekman, Deeg, Van Limbeek, Braam, De Vries, Tilburg, 1977, 1997).

What is already known about Type II Diabetes in Honduras

Current knowledge on diabetes in Honduras comes from the Pan American Health Organization and World Health Organization funded studied entitled: *The Central America Diabetes Initiative (CAMDI): Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua*. This initiative was conducted in order to determine the prevalence of diabetes and hypertension

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in Central America. The initiative estimates that by 2025, Honduras will have the greatest increase in diabetes amongst the studied Central American nations (2002). This can be seen in Table 1 which show the estimated diabetic population values for Central America according to the PAHO/WHO funded CAMDI.

Unfortunately, there are not enough government programs or other agencies conducting research in Honduras. Current financial resources seem to be given more to the treatment and assistance rather than to research. Therefore, these factors heighten the need for additional studies in Honduras.

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Estimated Population with Diabetes in Central America for 2000 & 2025 and Expected Increase in Percent

Country	2000	2025	Increase (%)
Belize	5,000	14,000	180
Costa Rica	107,000	257,000	140
El Salvador	142,000	347,000	144
Guatemala	235,000	640,000	172
Honduras	104,000	306,000	194
Nicaragua	106,000	297,000	180
Panama	85,000	194,000	128
Total Central America	784,000	2,055,000	162

Table 1: Estimated Diabetic Population for Central America according to the PAHO/WHO funded Central America Diabetes Initiative (CAMDI) (2002).

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Summary

In summary much is already known about the risk factors and potential life-threatening complications related to Type II Diabetes and pre-diabetes. Studies have shown the importance and relevance of lifestyle modification in the prevention and management of diabetes. The World Health Organization (WHO) and the International Diabetes Federation (IDF) have both developed recommendations based on the evidence and research of these studies. The consensus of their recommendations are to improve one's understanding through education, improve diet and exercising at least 30 minutes a day for 3 to 5 days a week (ADA & Alberti, Zimmet, et al., 2008, 2007). Additionally, studies have also indicated an importance in treating and managing behavioral symptoms in diabetic patients as an adjunct to preventive and management protocols for diabetics and pre-diabetics. However, as described earlier in this chapter a need for more ethnic-specific studies have also been indicated. Review of literature has provided guidance for the implications for this study in terms of selecting research variables, interventions, and research methodology.

Chapter Three

Methodology

Research Design

The design of this study was originally planned as a quantitative epidemiological survey. However, due to the unforeseen political unrest in Honduras a qualitative follow-up survey was conducted a year after the study was initially conducted in June 2009. The purpose of this study was to determine the prevalence of known risk factors associated with diabetes among JMA clinic patients in order to develop and test educational material and clinical interventions to reduce the incidence of pre-diabetes and uncontrolled Type II Diabetes. Medical staff at the JMA clinic was trained by the primary investigator to collect data. The primary investigator was onsite for the beginning of the study to train, monitor data collection and ensure all IRB compliance.

Patients were given Spanish translated consent forms and asked to participate in the study. Those who consented were then placed into one of two groups: Group 1 which consisted of patients receiving researcher developed educational material and medication (if necessary); and Group 2 which consisted of patients receiving researcher developed educational material, participated in an onsite exercise program, and received medication (if necessary). Group 2 participants were selected based on two factors: 1) patients willing to partake in an onsite exercise program; and 2) patients living near the JMA Clinic who could participate in a 5 day a week, 30 minutes a day exercise program. The exercise regimen for Group 2 began on 29 June 2009 and concluded on 17 December 2009.

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The exercise regimen was led by Lizeth Arely Amador Merlo the JMA clinic's nutritionist at the time of this study. Arely was taught the exercises by the primary investigator during the initial phase of this study, June 2009. Additionally the JMA clinic physician Dr. Xiomara Erazo supervised the study.

Participants were clinically monitored with each visit and variables recorded on all scheduled data collection points. Scheduled data collection points corresponded with each Group's scheduled education lesson. All patients were evaluated and seen by the JMA physician prior to participation in order to protect subjects from and minimize any potential risk of harm or discomfort that might have been associated with participation in this study but no more than any patient involved in the standard of care for patients with diabetes.

The independent variables that required only a single data collection were: age, gender, family history of diabetes, socio-demographical data (education level and level of income), and literacy. Independent variables for which data was collected throughout the study included: physical activity, medication, and education. Dependent variables for which data was collected throughout the study included: BMI (which was calculated by utilizing recorded height and weight), degree of tobacco use, blood pressure, blood glucose level, waist circumference, and level of depression. Each patient was also given an initial diabetic knowledge pre- and a post-intervention test. Educational lessons consisted of 9 lessons. Data were collected and recorded in a researcher provided notebook to track responses for statistical analyses and maintain confidentiality.

Research Objectives

Objectives for this research were:

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1. Determine the prevalence of Type II Diabetic patients who present at the James Moody Adams Clinic in Tegucigalpa, Honduras.
2. Determine the knowledge level of patients regarding their Type II Diabetes, via a pre- and post-test.
3. Determine and describe the relationship between the dependent variables (body mass index [BMI], blood glucose level, blood pressure, waist circumference, level of tobacco use, and level of depression) and the independent variables (age, gender, family history of diabetes, socio-demographical data [education level, level of income], literacy, and exercise regimen, medication, and diabetes knowledge).
4. Evaluate the effectiveness of the researcher-developed protocol for a nutritional and lifestyle modification intervention program to control Type II Diabetes.

The two primary hypotheses guiding this research were:

Hypothesis 1: A researcher-developed protocol of nutritional and lifestyle modification intervention will decrease patient glucose levels among Type II Diabetes mellitus patients presenting at the JMA clinic during the treatment period.

Hypothesis 2: A researcher-developed protocol of nutritional and lifestyle modification intervention will significantly decrease weight by 5 percent among pre-diabetic and Type II Diabetes mellitus patients presenting at the JMA clinic by the end of the treatment period.

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Procedure

This study followed a structured procedure. All patients that presented at the JMA clinic during the initial phase of this study (June 2009) were internally screened and any patient at risk for diabetes was tested. The criteria for at-risk pre-diabetes and Type II Diabetes are described in Appendix D. Each at-risk patient was screened and blood glucose levels checked. Each patient that was identified as being at risk or a known Type II Diabetic was then given a consent form for participation in this study. All participants were asked to read the consent form and if needed assistance were provided for those who could not read. The primary investigator with the help of a JMA clinic staff nurse made sure to clarify the consent form with all potential participants prior to their decision. Once, participants had acknowledged that they understood the meaning of the informed consent form and their participation in the study consenting participants were given a diabetic knowledge pre-test. The primary investigator collected data deemed appropriate for this initial phase of the study and taught the JMA clinic staff nurse how to collect follow-up data. Table 2 displays independent variables and their corresponding indicators. Table 3 shows dependent variables and their corresponding indicators. Collectively, they indicate the data collected during this initial phase and throughout the study.

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<i>Variables</i>	<i>Indicators</i>
Demographic Data	
Age	___
Gender	Male or Female
Family History of Diabetes	
Mother	Y / N
Father	Y / N
Sibling	Y / N
Socio-demographical Data	
Education Level Attained	___
Level of Income	___
Level of Diabetes Knowledge	___
Literacy Level	
Illiterate	___
Can read and write some	___
Literate	___

<i>Variables</i>	<i>Indicators</i>
Physical Activity	
Sedentary	< 60 min/wk
Insufficient	60 - 149 min/wk
Active	≥ 150 min/wk
Medication	
Type of Medication	___
Education	
Pre- / Post-Intervention Score	Out of 24

Table 2: Independent Variables and their corresponding indicators. Table on left were independent variables that required a onetime data collection during the initial phase. Table on right were independent variables collected throughout the study.

<i>Variables</i>	<i>Indicators</i>	<i>Variables</i>	<i>Indicators</i>
Body Mass Index (BMI)		Glucose	
Underweight	< 18.5	<i>Classification of Glucose</i>	<i>Fasting Plasma Glucose</i>
Normal	18.5 - 24.9	Normal	< 100 mg/dl
Overweight	25.0 - 29.9	Impaired Fasting Glucose (IFG)	100 - 125 mg/dl
Obese Class I	30.0 - 34.9	Diabetes mellitus	≥ 126 mg/dl
Obese Class II	35.0 - 39.9	Waist Circumference	
Obese Class III	≥ 40.0	At Risk (Male)	≥ 102 cm
Tobacco Use		At Risk (Female)	≥ 88 cm
Never Smoked	---	Depression	
Currently Smokes	___ cigarettes or packs / day	Level of Depression	0 to 60
Former Smoker	How long ago? And ___ cigarettes or packs / day		
Blood Pressure			
Normal	< 120 / < 80		
Pre-hypertension	120 -139 / 80 - 89		
Stage 1 Hypertension	140 -159 / 90 -99		
Stage 2 Hypertension	160 - 179 / 100 - 109		
Stage 3 Hypertension	≥ 180 / ≥ 110		

Table 3: Dependent Variables and their corresponding indicators that were collected throughout the study

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Participating patients were then divided into one of two groups. Group 1 consisted of patients who received researcher developed educational modules and medication (if necessary). Group 2 consisted of patients who received researcher developed educational lessons, medication (if necessary), and took part in a 30 minute onsite exercise regimen as recommended by the World Health Organization, International Diabetes Federation, and the American Diabetes Association. The exercise regimen was a 5 day a week regimen. This exercise regimen was led by one of the primary researcher trained JMA medical staff members. The exercise regimen consisted of a 10 minute warm-up session, followed by a 15 minute aerobic exercise, and ended with a 5 minute cool down session. The exercise regimen schedule breakdown can be seen in Appendix E.

Group 1 returned to the JMA clinic every other Monday to receive their researcher developed educational module and data collection. Group 2 participants were to attend the JMA clinic daily and every other Friday received their researcher developed educational module and data collection. As described in the limitations section in Chapter One the unexpected political unrest caused the study to be extended an additional month. Therefore, both groups returned to the JMA clinic for data collection and educational lessons 6 months. In August 2009 IRB approved the primary investigator to make some minor changes to the study. The changes that were allowed by the IRB were:

1. Extend the study from November 13 to December 17, 2009.
2. Contact all who signed agreement to participate in order to determine feasibility to continue as planned.
3. Extend recruitment to the study through September 2009 to offset the losses from those pre-enrolled to meet sample size goals.

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4. Allow participants to continue the program if they missed a session due to curfews and other official government advisories not to travel.

These changes allowed the primary investigator and the JMA clinic staff to recruit 17 new participants. However, unforeseen events related to teleconferencing and internet connection problems initial data was never recorded for these new participants. Consequently, their participation and their data were not included in this study because there was no pre-intervention data to make comparison too. However, the final participation count for this study was 48, which was half of the original 96 enrolled participants. Educational lessons were translated into Spanish. The final educational lessons schedule is displayed in Figure 4.

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Lesson		Scheduled Date	
		Group 1	Group 2
1	What is Diabetes	6-Jun	3-Jul
2	Diet: Healthy Eating for Diabetics	13-Jul	17-Jul
3	Diet: Portion Control	27-Jul	31-Jul
4	Importance of Exercise	10-Aug	14-Aug
5	Complications of Type II Diabetes	24-Aug	28-Aug
6	Medications	7-Sep	11-Sep
7	Diabetic Self-care Management	21-Sep	25-Sep
8	Depression and Diabetes	5-Oct	9-Oct
9	Overall Review and Follow-Up	19-Oct	23-Oct
1	What is Diabetes	2-Nov	6-Nov
2	Diet: Healthy Eating for Diabetics	16-Nov	20-Nov
3	Diet: Portion Control	30-Nov	4-Dec
4	Importance of Exercise	14-Dec	17-Dec

Figure 4: Educational Lesson Schedule

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Population and Sample

A power test analysis was conducted utilizing GPOWER, which is an a priori, post-hoc, and compromise power analyses for MS-DOS computer program (Faul, Erdfelder, 1992). A two tailed t-test for means, a priori analysis was conducted utilizing an effect size d of 0.8, alpha of 0.05, and power equal to 0.95. Delta was calculated to be 3.6661, with critical $t(82) = 1.9893$ and actual power equaled to 0.9518. The calculated total sample size required for this study was 84. However, the total number of subjects recruited was contingent upon the total number of screened patients at the JMA clinic during the first phase of this study, June 2009.

The population sample included adult male and female patients (age 18 and older) who attended the James Moody Adams Clinic in Tegucigalpa, Honduras during the first phase of this study, June 2009. The sample included adult patients from the population who accepted participation into the study and completed the Institutional Review Board approved consent forms. Participants included those patients who already known Type II Diabetics and those patients screened and found to be pre-diabetic or newly diagnosed Type II Diabetics during the initial phase of this study, June 2009. Vulnerable patient populations (prisoners, pregnant women, children, and patients with severe mental disorders) and patients showing signs or symptoms of diabetic complications were excluded from this study. Patients deemed medically unfit to participate in the vigorous exercise regimen by the JMA clinic physician were excluded from this study.

The patient base of the JMA Clinic was made up of individuals who live in the surrounding barrios and villas around the Baxter Institute. These patients primarily live in a poorer sector of Tegucigalpa. There was also a week during the initial phase of the study in which a medical and ophthalmological brigade occurred. Patients seen during this week were

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additionally screened for proximity and feasibility to participate in this study. Overall, the population was more representative of Hondurans who reside under the poverty line; which as described by the CDC is approximately 50.7 percent of all Hondurans (CIA WFB, 2009).

Instrumentation

Quantitative data were collected using instrumentation as appropriate for each aspect of the study. JMA Clinic's trained medical staff assisted in data collection after completing training by the primary investigator.

1. Glucometer

- a. Fasting plasma glucose testing is the preferred method of diagnosing diabetics in children and non-pregnant adults (ADA, 2008). Additionally, the ADA does not recommend the use of A1C for diagnostic purposes at this time (2008). Therefore for the purposes of this study, diabetes diagnosis and glucose levels were obtained by fasting plasma glucose testing. The primary instrument, a glucometer, was utilized to assess and classify patient's glucose levels as recommended by the World Health Organization, International Diabetes Federation, and American Diabetes Association. Prior to each administration of testing, the glucometer was calibrated. A glucometer is defined as a dedicated point-of-care device that can quantify fasting glucose within five minutes (Medical Dictionary, 2009).

2. Scales

- a. Scales were calibrated and verified for medical application to assess each patient's weight. The researcher checked the weighting device to determine absolute zero setting before weighing each patient. Height was also measured

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using a similar medical apparatus validated for this use. BMI was then calculated for each participating patient using World Health Organization criteria for BMI calculation.

- b. Waist circumference was determined with utilization of a tension tape. The WHO recommends that waist circumference be taken over little to no clothing. The measurement was taken: 1) at the end of a normal expiration; 2) with the arms relaxed at the sides; 3) at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest, and; 4) measurements were recorded to the nearest 0.1cm, while making sure to keep the measuring tap snug but not tight enough to cause compression of the skin (WHO, 2008).
3. *Blood Pressure Cuffs*
 - a. Researcher checked blood pressure cuffs utilized to measure each patient's blood pressure level. Blood pressure was measured twice, with the patients seated and their left arm resting on a flat surface at the height of the heart. Measurements were taken at least five minutes apart and after the patient had sat down. If a difference of more than 10 mmHg was found between the first and second reading a third measurement was taken. The average of the first and second measurements were reported, and in cases in which a third reading was needed, the two closest values were averaged.
4. *Exercise Regimen Participation Checklist*
 - a. A 30 minute exercise regimen based upon WHO, IDF, and ADA recommendations was created and implemented for those patients participating in

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Group 2 of this study. The exercise regimen was a 5 day a week aerobic exercise regimen.

5. *Diabetic Knowledge test*

- a. A diabetic knowledge test was utilized during the initial phase of this study and again at the end of the study. This test was given to be utilized as a quantitative pre- versus post-intervention measurement of participants' diabetic knowledge level. This test was translated into Spanish. Additionally, this 24 question test (see Appendix F) achieved a reliability coefficient of 0.78 which indicates internal consistency; it also showed sensitivity to educational interventions which suggest construct validation (Garcia, Villagomez, Brown, Kouzekanani, Hanis, 2001).

6. *Depression Questionnaire*

- a. A depression questionnaire was utilized to determine, if present, the level of depression (See Appendix G). This questionnaire was translated into Spanish. The questionnaire was a 20 question self-reported scale. The scale that was employed in this study was the Center for Epidemiologic Studies Depression scale (CES-D). This scale is not intended for clinical diagnosis. The CES-D has shown a high internal consistency, acceptable test-retest stability, excellent concurrent validity by clinical and self-report criteria, and substantial evidence of construct validity (Radloff & Beekman, Deeg, Van Limbeek, Braam, De Vries, Tilburg, 1977, 1997).

7. *Diabetic Education Lessons*

- a. Researcher developed diabetic education lessons were conducted every other week. Group 1 received their education lessons on every other Monday and

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Group 2 received their education lessons on every other end of the corresponding Group 1 week. The education lesson schedule can be seen in Table 2. Each lesson consisted of mini post-test which consisted of five questions related to that day's educational lesson. These lessons were based on basic information from various WHO, IDF, and ADA sources.

8. *Qualitative Follow-up Survey*

- a. Researcher developed qualitative follow-up survey consisted of 6 short response questions. This survey was then translated into Spanish. The survey was given to 13 randomly selected participants from the pre-enrolled participant list. This survey was given by native speaking JMA clinic staff. Responses were recorded on and placed in the primary investigator's protected file in the JMA clinic.

Data Collection

Data were collected in a pre-determined sequence as shown in Figure 5: Data Collection Flow Chart.

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Initial Phase: June 2 - 26, 2009

- Training of JMA medical staff on Data Collection and Exercise Regimen protocols. Screening all adult JMA clinic patients for pre-diabetes and type II diabetes. Participants are assigned to either Group 1 or Group 2 and initial data is collected. Data to be collected are the Independent and Dependent Variables as listed in Table 1.

Intervention Phase: June 29 - July 31, 2009

• **Group 1:**

- June 29th receive Education lesson 1: What is Diabetes. They also had independent and dependent variable data collected as indicated in Table 1.
- July 13th receive Education lesson 2: Diet: Healthy Eating for Diabetics. They also had independent and dependent variable data collected as indicated in Table 1.
- July 27th received Education lesson 3: Diet: Portion Control. They also had independent and dependent variable data collected as indicated in Table 1.

• **Group 2:**

- Monday - Friday attend JMA clinic for 30 minute a day exercise regimen as listed in Appendix E.
- July 3rd receive Education lesson 1: What is Diabetes. They also had independent and dependent variable data collected as indicated in Table 1.
- July 17th receive Education lesson 2: Diet: Healthy Eating for Diabetics. They also had independent and dependent variable data collected as indicated in Table 1.
- July 31st receive Education lesson 3: Diet: Portion Control. They also had independent and dependent variable data collected as indicated in Table 1.

Intervention Phase: August 2009

• **Group 1:**

- August 10th receive Education lesson 4: Importance of Exercise. They also had independent and dependent variable data collected as indicated in Table 1.
- August 24th receive Education lesson 5: Complications of Type II Diabetes. They also had independent and dependent variable data collected as indicated in Table 1.

• **Group 2:**

- Monday - Friday attend JMA clinic for 30 minute a day exercise regimen as listed in Appendix E.
- August 14th receive Education lesson 4: Importance of Exercise. They also had independent and dependent variable data collected as indicated in Table 1.
- August 28th receive Education lesson 5: Complications of Type II Diabetes. They also had independent and dependent variable data collected as indicated in Table 1.

• **IRB approved amendments**

- VCOM IRB approved amendments to the study which include the following: 1) Extend the study from Nov. 13 to Dec. 17, 2009; 2) contact all who signed agreement to participate to determine continued study feasibility; 3) extend recruitment through Sept 2009; 4) allow subjects to continue the program if sessions are missed; and, 5) utilize grant funds to purchase diabetic medications.

• **Video Conference**

- Discussion with JMA Clinic physician about study amendments and how to record data for new recruited participants.

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Intervention Phase: September 2009

• **Group 1:**

- September 7 receive Education lesson 6: Medications. They also had independent and dependent variable data collected as indicated in Table 1.
- September 21st receive Education lesson 7: Diabetic Self-care Management. They also had independent and dependent variable data collected as indicated in Table 1.

• **Group 2:**

- Monday - Friday attend JMA clinic for 30 minute a day exercise regimen as listed in Appendix E.
- September 11th receive Education lesson 6: Medications. They also had independent and dependent variable data collected as indicated in Table 1.
- September 25th receive Education lesson 7: Diabetic Self-care Management. They also had independent and dependent variable data collected as indicated in Table 1.

• **New participant Recruitment**

- JMA Clinic staff recruited 17 new participants. However, unforeseen events precluded their participation and their data was not included in this study.

Intervention Phase: October 2009

• **Group 1:**

- October 5th receive Education lesson 8: Depression and Diabetes. They also had independent and dependent variable data collected as indicated in Table 1.
- October 19th receive Education lesson 9: Overall Review and Follow-Up. They also had independent and dependent variable data collected as indicated in Table 1.

• **Group 2:**

- Monday - Friday attend JMA clinic for 30 minute a day exercise regimen as listed in Appendix E.
- October 9th receive Education lesson 8: Depression and Diabetes. They also had independent and dependent variable data collected as indicated in Table 1.
- October 23rd receive Education lesson 9: Overall Review and Follow-Up. They also had independent and dependent variable data collected as indicated in Table 1.

Intervention Phase: November 2009

• **Group 1:**

- November 2nd receive Education lesson 1: What is Diabetes. They also had independent and dependent variable data collected as indicated in Table 1.
- November 16th receive Education lesson 2: Diet: Healthy Eating for Diabetes. They also had independent and dependent variable data collected as indicated in Table 1.
- November 30th receive Education lesson 3: Diet: Portion Control. They also had independent and dependent variable data collected as indicated in Table 1.

• **Group 2:**

- Monday - Friday attend JMA clinic for 30 minute a day exercise regimen as listed in Appendix E.
- November 6th receive Education lesson 1: What is Diabetes. They also had independent and dependent variable data collected as indicated in Table 1.
- November 20th receive Education lesson 2: Diet: Healthy Eating for Diabetics. They also had independent and dependent variable data collected as indicated in Table 1.

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Intervention Phase: December 2009

• **Group 1:**

- December 14th receive Education lesson 4: Importance of Exercise. They also had independent and dependent variable data collected as indicated in Table 1.

• **Group 2:**

- Monday - Friday attend JMA clinic for 30 minute a day exercise regimen as listed in Appendix E.
- December 4th receive Education lesson 3: Diet: Portion Control. They also had independent and dependent variable data collected as indicated in Table 1.
- December 17th receive Education lesson 4: Importance of Exercise. They also had independent and dependent variable data collected as indicated in Table 1.

Figure 5: Data Collection Flow Chart

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Data Analysis

The quantitative data were collected and stored on a project database created by Microsoft Excel computer software. A SPSS program and Microsoft Excel program were utilized to conduct a data analysis of descriptive statistics to summarize the characteristics of the JMA clinic diabetic population; paired and unpaired t-tests were also conducted to help show significance ($p < 0.05$) of pre- and post-intervention data. Finally, a six question follow-up survey was conducted a year after the study was completed. Responses were recorded and translated into themes and categories.

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Chapter Four

Findings

The purpose of this study was to determine the prevalence of risk factors associated with diabetes among JMA clinic patients in Tegucigalpa, Honduras in order to develop and test educational material and clinical interventions in an attempt to reduce the incidence of pre-diabetes and uncontrolled Type II Diabetes. The principle investigator, with assistance from JMA clinic trained staff collected and ran this IRB approved study. The objectives of this study were to:

1. Determine the prevalence of Type II Diabetic patients who present at the James Moody Adams Clinic in Tegucigalpa, Honduras.
2. Determine the knowledge level of patients regarding their Type II Diabetes, via a pre and post-test.
3. Determine and describe the relationship between the dependent variables (body mass index [BMI], blood glucose level, blood pressure, waist circumference, level of tobacco use, and level of depression) and the independent variables (age, gender, family history of diabetes, socio-demographic data [education level, level of income], literacy, and exercise regimen, medication, and diabetes knowledge).
4. Evaluate the effectiveness of the researcher-developed protocol for a nutritional and lifestyle modification intervention program to control Type II Diabetes.

The two primary hypotheses guiding this research were:

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Hypothesis 1: A researcher-developed protocol of nutritional and lifestyle modification intervention will decrease patient glucose levels among Type II Diabetes mellitus patients presenting at the JMA clinic during the treatment period.

Hypothesis 2: A researcher-developed protocol of nutritional and lifestyle modification intervention will decrease weight by 5 percent among pre-diabetic and Type II Diabetes Mellitus patients presenting at the JMA clinic by the end of the treatment period.

Determine the prevalence of Type II Diabetic patients who present at the James Moody Adams Clinic in Tegucigalpa, Honduras.

The prevalence of Type II Diabetes Mellitus patients at the JMA clinic in Tegucigalpa, Honduras was calculated by utilizing the following equation:

$$Prevalence = \frac{Observed\ Type\ II\ Diabetics}{Total\ Population\ seen} \times 100\%$$

The total number of observed Type II Diabetics by the primary investigator was 100. Four in the observed Type II Diabetic population were considered too severe to participate in this study. The total population seen by this primary investigator was 655 for the month of June 2009.

Therefore, the prevalence of Type II Diabetic patients who presented at the JMA clinic was 15.27 percent.

The distribution of categorical data (gender, family history of diabetes, physical activity, blood pressure, education level, medication, level of income, tobacco use and literacy) was collected and shown in Table 4.

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Adams Clinic at the Baxter Institute

Description	N (n= 96)	%
Gender		
Male	19	19.79
Female	77	80.21
Family History of Diabetes		
None	40	41.67
Mother only	26	27.08
Father only	7	7.29
Sibling only	14	14.58
Mother & Father	1	1.04
Mother & Sibling	4	4.17
Father & Sibling	3	3.13
Mother, Father & Sibling	1	1.04
Physical Activity		
Sedentary (< 60 mins/week)	83	86.46
Insufficient (60 - 149 mins/week)	9	9.38
Active (\geq 150 mins/week)	4	4.17
Blood Pressure		
Normal (<120/<80)	36	37.50
Pre-Hypertension (120-139/80-89)	28	29.17
Stage 1 Hypertension (140-159/90-99)	19	19.79
Stage 2 Hypertension (160-179/100-109)	9	9.38
Stage 3 Hypertension (\geq 180/ \geq 110)	4	4.17
Education Level		
No schooling	4	4.17
1st grade	1	1.04
2nd grade	2	2.08
3rd grade	32	33.33
4th grade	5	5.21
5th grade	2	2.08
6th grade	23	23.96
High school	14	14.58
College	13	13.54
Medication		
None	59	61.46
Glibenclamida & Metformin	16	16.67
Glibenclamida	11	11.46
Given a sample of Metformin	1	1.04
Metformin & Insulin	4	4.17
Metformin	3	3.13
Glibenclamida & Insulin	1	1.04
Glicemet	1	1.04
Level of Income		
Low	92	95.83
Middle	4	4.17
Tobacco Use		
None	90	93.75
1/2 ppd	1	1.04

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1 ppd	3	3.13
2 ppd	1	1.04
1 cannabis (joint/day)	1	1.04
Literacy		
Cannot read or write	4	4.17
Can read and write with help	13	13.54
Can read and write	79	82.29

Table 4: Distribution of Gender, Family History of Diabetes, Physical Activity, Blood Pressure, Education Level, Medication, Level of Income, Tobacco Use, and Literacy for Pre-Intervention

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During the initial phase of the study there was nearly a 4:1 ratio of women to men who enrolled in this diabetes prevention program. Of these participants 41.67 percent of them had no self-reported family history of diabetes; whereas 58.33 percent had some family history of diabetes. The most common type of self-reported family history of diabetes was mother only (27.08 percent). Participants identify themselves as low, middle or high income workers. Of the 96 participants 4.17 percent considered themselves as middle income workers – making more than minimum wage – while the remaining 95.83 percent considered themselves low income workers. The literacy rate for this population was 82.29 percent that could read and write, 13.54 percent that could write but required assistance to read at times, and 4.17 percent that could not read or write. These same individuals that could not read or write were also the same 4.17 percent that had no schooling. Yet, 28.12 percent of participants had completed high school (14.58 percent) or college (13.54 percent). Physical activity was shown to be a low priority for these participants as 86.46 percent reported doing less than 60 minutes a week of exercise. Consequently, 62.5 percent of initially enrolled participants had pre-hypertension (29.17 percent) or hypertension (33.33 percent); and 38.54 percent of participants were on some form of diabetic medication. Most common diabetic medication was Glibenclamida and Metformin (16.67 percent).

Additional data that helped describe medical background; primarily continuous data (age, blood glucose, body mass index, waist circumference, depression score and diabetes knowledge score) are shown in Table 5.

Table 5 shows the average age of initially enrolled participants to the JMA clinic as 47.81 with a range of 21 years of age to 75 years of age. Participants were on average considered at-risk obese diabetics with an average blood glucose reading of 159.97 mg/dL, an average BMI of

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30.95, and waist circumferences that on average were above the at-risk level for men (mean of 102.29 cm) and women (mean of 98.04 cm) respectively. Participants were also considered depressed since average depression scores were greater than 16 (mean score 18.49) as indicated by the CES-D depression questionnaire. Finally, the diabetic knowledge of these initially enrolled participants was low; on average participants were only able to answer about 44 percent of the questions correctly on the pre-test diabetes knowledge questionnaire.

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Description	Mean	SD	Min	Max
Age	47.81	1.57	21	75
Blood Glucose	159.97	9.25	67	557
Body Mass Index	30.95	0.71	20.07	57.26
Waist Circumference (cm)				
Male	102.29	2.79	84	122
Female	98.04	1.50	73	135
Depression Score (0 - 60)	18.49	1.15	0	45
Diabetes Knowledge Score (out of 24)	10.57	0.45	0	22

Table 5: Distribution of Age, Blood Glucose, Body Mass Index, Waist Circumference, Depression Score, Diabetes Knowledge Score For Pre-Intervention (where n = 96). Mean, Standard Deviation (SD), Minimum value, Maximum value collected for the pre-intervention participants that occurred in June 2009.

Determine the knowledge level of patients regarding their Type II Diabetes, via a pre- and post-test.

The gain in diabetes knowledge in participants in this research study was determined by comparing the pre-test and post-test scores on a diabetes knowledge questionnaire and using a paired t-test statistical tool. The data represented in Figure 6 illustrates the change in scores for both groups combined and stratified.

As illustrated in Figure 6 diabetes knowledge scores were stratified by participant groups. The pre-test and post-test scores of a diabetes knowledge questionnaire were collected and analyzed using a paired t-test statistical tool. The data represented in Table 6 show the mean and standard deviation of scores for Group 1 and Group 2 with their respective P-value.

The mean of pre-test diabetes knowledge for group one members – which consisted of 36 members – was 9.94 out of a possible 24. The mean for these same participants post-intervention was 16.97 out of a possible 24. The determined p-value for group one indicated a significant gain in diabetes knowledge with $p = 7.86E-09$ ($p < 0.0001$). The mean for pre-test diabetes knowledge for group two members – which consisted of 12 members – was 12.92 out of a possible 24. The mean for these same participants post-intervention was 19.17 out of a possible 24. The determined p-value for group two also indicated a significant gain in diabetes knowledge with $p = 0.001$ ($p < 0.05$). Thus, regarding diabetic knowledge level both groups showed a significant difference between pre and post educational intervention.

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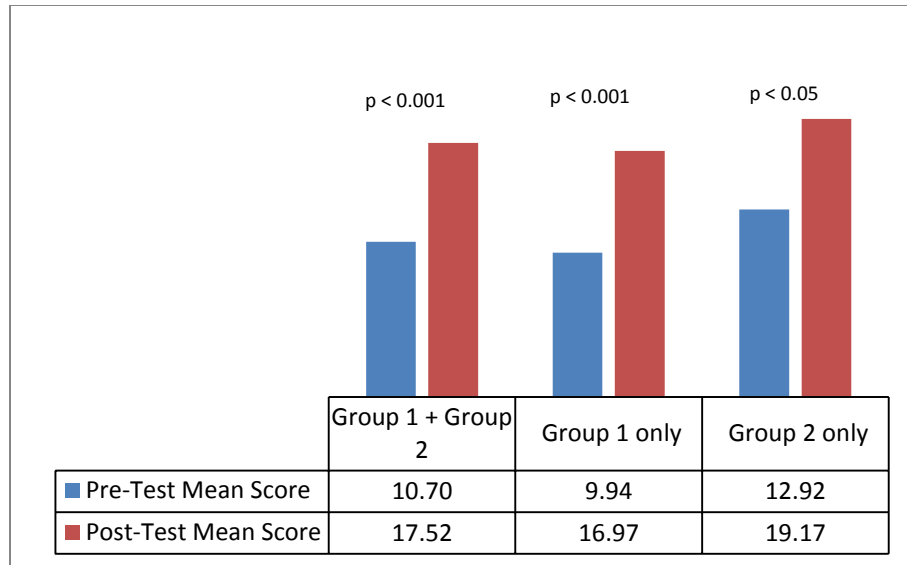


Figure 6: Distribution of Pre- / Post-test Diabetes Knowledge Score. Mean scores for Pre- and Post-test Diabetes Knowledge Scores (out of 24). P-value for Group 1 + Group 2 was $p = 7.90E-11$, Group 1 was $p = 7.86E-09$, and Group 2 was $p = 0.001$

Outcomes	Pre-Test		Post-Test		P-value
	Mean	SD	Mean	SD	
Group 1 (n = 36)	9.94	4.48	16.97	4.53	7.86E-09
Group 2 (n = 12)	12.92	4.01	19.17	4.32	0.001

Table 6: Distribution of Pre- and Post-Test Diabetes Knowledge Scores (scores out of 24) {n = 48}. Mean, Standard Deviation (SD) and P-value. $p < 0.001$ which indicates significance.

Determine and describe the relationship between the dependent variables (body mass index [BMI], blood glucose level, blood pressure, waist circumference, level of tobacco use, and level of depression) and the independent variables (age, gender, family history of diabetes, socio-demographic data [education level, level of income], literacy, and exercise regimen, medication, and diabetes knowledge).

The pre-intervention and post-intervention distribution of categorical data (gender, family history of diabetes, physical activity, blood pressure, education level, medication, level of income, tobacco use and literacy) for both dependent and independent variables were collected and shown in Table 7.

Post-intervention, there were 48 participants consisting of 36 females and 12 males, a 3:1 ratio of women to men. Of these participants, 41.67 percent had no self-reported family history of diabetes; whereas 58.33 percent had some family history of diabetes. The most common type of self-reported family history of diabetes was mother only (29.17 percent). Only one person (2.08 percent) considered themselves a middle income worker while the remaining 97.92 percent reported being low income workers. The literacy rate for this population was 83.33 percent that could read and write, 12.50 percent that could write but required assistance to read at times and two individuals (4.17 percent) who could not read or write. Of the two individuals who could not read or write, one also indicated completion of only the first grade and the other had no schooling at all. Meanwhile, 25 percent of participants indicated that they had completed high school (14.58 percent) or college (10.42 percent).

The primary changes observed between pre and post-test with regard to the categorical variables were physical activity, blood pressure, medication and tobacco use. Figure 7 illustrates

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the change in physical activity between the pre- and post-intervention. The population size (n) is 48.

The biggest change in the physical activity category was sedentary in which 40 individuals reported doing less than 60 minutes a day of exercise, pre-intervention. Post-intervention, there was a 97.5 percent decrease in sedentary activity (minus 39 participants) and a 1750 percent increase (plus 35 participants) in the active category.

Figure 8 illustrates the changes in pre- and post-intervention blood pressure status. Pre-intervention, 62.5 percent of participants were found to be pre-hypertensive (33.33 percent) and hypertensive (29.17). Post-intervention, there was a 44.4 percent increase in participants with Normal blood pressure while there was a decrease in pre-hypertension (12.5 percent decrease) and hypertension (42.8 percent decrease).

Of these 48 participants, 47.92 percent were on some form of diabetic medication. The most common diabetic medication was Glibenclamida and Metformin (22.92 percent). Figure 9 illustrates the changes in pre- and post-intervention diabetic-related medication use. This category showed minimal changes ($p > 0.05$) in overall diabetic medication needs. The biggest change came in number of participants requiring use of Glibenclamida and Metformin (18.2 percent increase). One participant was originally taking no diabetic medication and the other was an individual that required only Metformin.

Figure 10 illustrates the changes in pre- and post-intervention tobacco use. Since a majority of participants reported no smoking pre-intervention there was minimal change ($p > 0.05$) in tobacco use. The biggest change (67 percent increase) came in number of participants who reported not smoking post-intervention (plus 3 individuals). There was a change of minus one individual in each of the following categories for tobacco use: half pack per day use (100

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percent decrease), one pack per day use (50 percent decrease) and two packs per day use (100 percent decrease) history. There was no change with the participant reporting one cannabis per day usage.

Table 8 shows the pre- and post-intervention distribution of continuous variable data (age, blood glucose, body mass index, waist circumference, depression score and diabetes knowledge score). The average age of participants was 50.15 with a range of 21 years old to 75 years old. The final population size was reduced by 50 percent from the initially enrolled participant list, n is now 48. The only category in this group to show a P-value of significance ($p < 0.001$) was post-diabetic knowledge.

Table 9 shows the pre- and post-intervention distribution of continuous variable data (body mass index, blood glucose, waist circumference, depression score and diabetes knowledge) stratified by group. The total population post-intervention was 48 ($n = 48$). Population size for Group 1 was 36 ($n_{G1} = 36$). Population size for Group 2 was 12 ($n_{G2} = 12$). The number of males in Group 1 was 10 ($n_{G1m} = 10$). The number of females in Group 1 was 26 ($n_{G1f} = 26$). The number of males in Group 2 was 2 ($n_{G2m} = 2$). The number of females in Group 2 was 10 ($n_{G2f} = 10$). The calculated P-values show that there was only a significant change post-intervention in participants' diabetic knowledge ($p < 0.001$ for Group 1 and $p < 0.05$ for Group 2).

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Description	Pre-Intervention Data		Post-Intervention Data	
	N (n= 48)	%	N (n= 48)	%
Gender				
Male	12	25.00	12	25.00
Female	36	75.00	36	75.00
Family History of Diabetes				
None	20	41.67	20	41.67
Mother only	14	29.17	14	29.17
Father only	2	4.17	2	4.17
Sibling only	8	16.67	8	16.67
Mother & Father	0	0.00	0	0.00
Mother & Sibling	2	4.17	2	4.17
Father & Sibling	2	4.17	2	4.17
Mother, Father & Sibling	0	0.00	0	0.00
Physical Activity				
Sedentary (< 60 mins/week)	40	83.33	1	2.08
Insufficient (60 - 149 mins/week)	6	12.50	10	20.83
Active (\geq 150 mins/week)	2	4.17	37	77.08
Blood Pressure				
Normal (<120/<80)	18	37.50	26	54.17
Pre-Hypertension (120-139/80-89)	16	33.33	14	29.17
Stage 1 Hypertension (140-159/90-99)	9	18.75	7	14.58
Stage 2 Hypertension (160-179/100-109)	3	6.25	1	2.08
Stage 3 Hypertension (\geq 180/ \geq 110)	2	4.17	0	0.00
Education Level				
No schooling	1	2.08	1	2.08
1st grade	1	2.08	1	2.08
2nd grade	2	4.17	2	4.17
3rd grade	17	35.42	17	35.42
4th grade	3	6.25	3	6.25
5th grade	1	2.08	1	2.08
6th grade	11	22.92	11	22.92
High school	7	14.58	7	14.58
College	5	10.42	5	10.42
Medication				
None	25	52.08	24	50.00
Glibenclamida & Metformin	11	22.92	13	27.08
Glibenclamida	5	10.42	5	10.42
Given a sample of Metformin	0	0.00	0	0.00
Metformin & Insulin	3	6.25	3	6.25
Metformin	3	6.25	2	4.17
Glibenclamida & Insulin	0	0.00	0	0.00
Glicemet	1	2.08	1	2.08
Level of Income				
Low	47	97.92	47	97.92
Middle	1	2.08	1	2.08
Tobacco Use				

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None	43	89.58	46	95.83
1/2 ppd	1	2.08	0	0.00
1 ppd	2	4.17	1	2.08
2 ppd	1	2.08	0	0.00
1 cannabis (joint/day)	1	2.08	1	2.08
Literacy				
Cannot read or write	2	4.17	2	4.17
Can read and write with help	6	12.50	6	12.50
Can read and write	40	83.33	40	83.33

Table 7: Distribution of Gender, Family History of Diabetes, Physical Activity, Blood Pressure, Education Level, Medication, Level of Income, Tobacco Use, and Literacy For Pre- and Post-Intervention Data

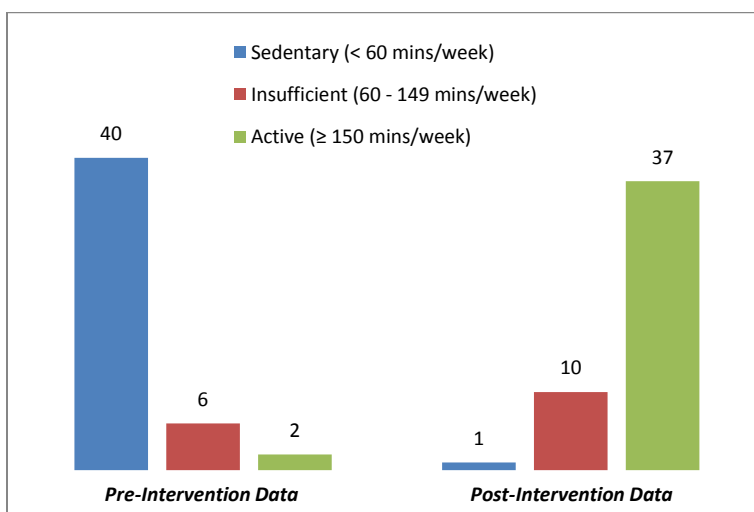


Figure 7: Distribution of Physical Activity for Pre- / Post-Intervention Data

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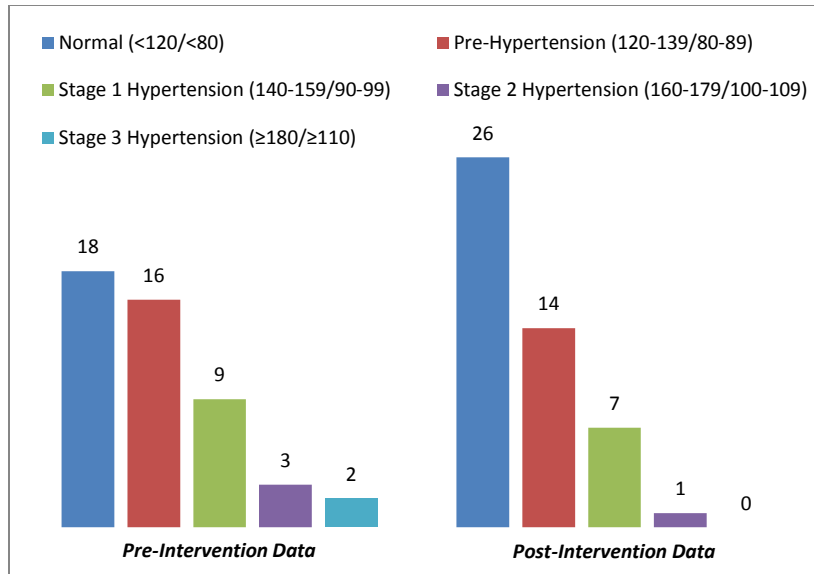


Figure 8: Distribution of Blood Pressure for Pre- / Post-Intervention Data

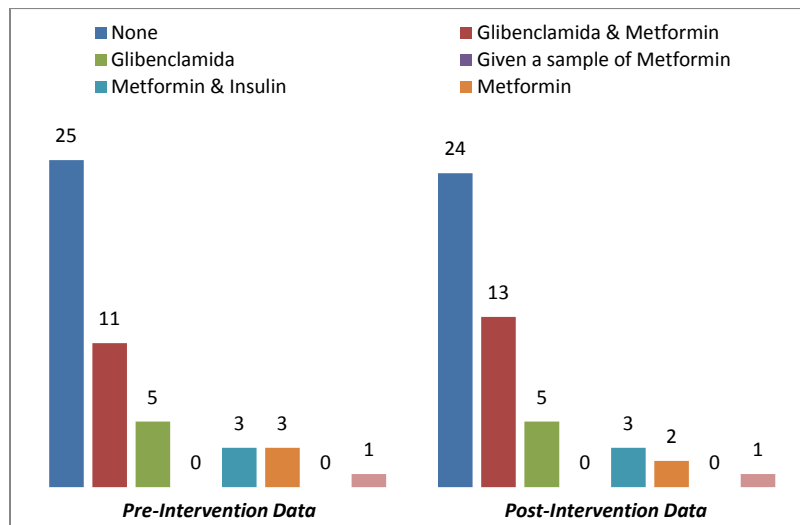


Figure 9: Distribution of Medication for Pre- / Post-Intervention Data

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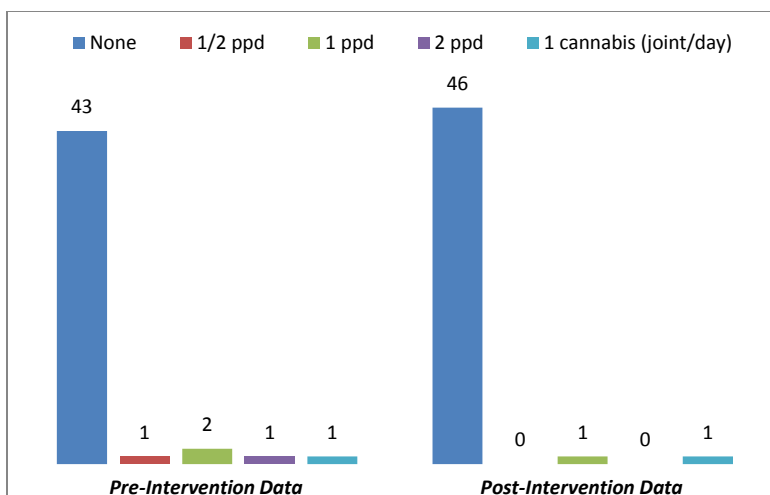


Figure 10: Distribution of Smoking for Pre- / Post-Intervention Data

Description	Pre-Intervention				Post-Intervention				P-value
	Mean	SD	Min	Max	Mean	SD	Min	Max	
Age	50.15	2.27	21	75	50.15	2.27	21	75	-----
Blood Glucose	167.21	13.94	67	557	142.02	8.31	73	317	0.12*
Body Mass Index	30.52	1.02	22.86	57.26	30.19	1.00	22.5	56.6	0.82*
Waist Circumference (cm)									
Male (n = 12)	101.38	3.85	85	122	97.58	2.90	84	116	0.44*
Female (n = 36)	98.44	2.18	74	128	97.19	2.02	72	126	0.68*
Depression Score (0 - 60)	18.34	1.54	0	43	16.96	1.41	6	50	0.63*
Diabetes Knowledge Score (out of 24)	10.70	0.66	0	20	17.52	0.65	9	24	7.90E-11**

Table 8: Distribution of Age, Blood Glucose, Body Mass Index, Waist Circumference, Depression Score, Diabetes Knowledge Score For Pre- / Post-Intervention. Mean, Standard Deviation (SD), Minimum value (Min), Maximum value (Max) collected for the pre- and post-intervention participants that occurred in June and December 2009. The final column represents the P(T<=t) two tail.

* p > 0.05

** p < 0.001

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Outcomes	Group 1					Group 2				
	Pre-		Post-		P-value	Pre-		Post-		P-value
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Body Mass Index	30.85	7.98	30.60	7.86	0.89*	29.55	3.04	28.96	2.90	0.63*
Blood Glucose	172.64	103.06	146.58	55.56	0.19*	150.92	75.33	128.33	63.84	0.44*
Waist Circumference (cm)										
<i>Males</i>	97.45	10.68	94.10	6.52	0.41*	121.00	1.41	115.00	1.41	0.05*
<i>Females</i>	100.71	14.12	99.04	13.45	0.66*	92.55	7.58	92.40	5.89	0.96*
Depression (0-60)	18.14	11.36	18.25	10.25	0.97*	17.42	9.12	13.08	7.14	0.21*
Diabetes Knowledge (out of 24)	9.94	4.48	16.97	4.53	7.86E-09***	12.92	4.01	19.17	4.32	0.001**

Table 9: Distribution of Pre-Intervention and Post-Intervention scores for continuous variables stratified by Group (Group 1: Education alone; Group 2: Education and Exercise). Mean and Standard Deviation (SD) collected for the pre- and post-intervention participants that occurred in June and December 2009. The final column per Group represents the P(T<=t) two tail.

* p > 0.05

** p < 0.05

*** p < 0.001

Evaluate the effectiveness of the researcher-developed protocol for a nutritional and lifestyle modification intervention program to control Type II Diabetes

The principle investigator, with assistance from the JMA clinic staff, interviewed 13 randomly selected participants. The JMA clinic staff contacted and questioned the 13 randomly selected participants in their native Honduran Spanish (see Appendix H for English version and Spanish Version of survey). The primary investigator then translated and coded the responses. Please see Appendix I for a table that displays the various categories for each qualitative survey question with each groups' response. The data analysis provided rationale and a description for each of the following research questions:

1. What prevented you from coming to the clinic on all the days assigned for you to take part in the diabetic program?
2. To what extent did the political situation make you uncomfortable attending the clinic?
3. To what extent will the activities that you learned in this diabetes program help you long-term with your diabetes?
4. How happy were you with your weight loss at the close of the study, 17 December 2009?
5. Have you been able to maintain your weight level as it was at the end of this study?
6. What was most difficult about fully participating in this study?

The randomly selected participants consisted of 11 females and 2 males who ranged in the ages of 20-39 (7 participants), 40-59 (3 participants) and 60-79 (3 participants). In addition, there were eight members from Group 1 and five members from Group 2 represented in this group of randomly selected participants. Ten participants were initially screened as pre-diabetic

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and three were screened as Type II Diabetics. Eleven of the participants could read without assistance, one could read and write with assistance and one could not read or write. There was one member who had no schooling, four who achieved a 3rd grade education, five who achieved a 6th grade education, one that completed high school, and two that completed college. Of these 13 randomly selected participants five had no family history of diabetes, three had a mother with diabetes, one had a father with diabetes, three had a sibling(s) with diabetes, and one had a father and sibling with diabetes.

What prevented you from coming to the clinic on all the days assigned for you to take part in the diabetic program? Overall, the group was mixed on program attendance. Thirty-eight percent of the group felt that work prevented them from attending the program, while another 30 percent of the participants believed there was no preventative issue. A small percent reported they were unable to attend due to family obligations, medically related issues, inconvenient traveling distance, and financial reasoning. One respondent reported that he was unable to attend because he “got a job,” while another had “to take care of son.”

To what extent did the political situation make you uncomfortable attending the clinic? This question required the participant to select one of four possible choices. The majority of the group (53.8 percent) indicated that the political situation did not make them feel uncomfortable attending the JMA clinic. However, the other 46.2 percent reported that the political unrest did make them uncomfortable in some fashion – 23.1 percent reported it made them a little uncomfortable and 23.1 percent that it made them uncomfortable.

To what extent will the activities that you learned in this diabetes program help you long term with your diabetes? The majority of the group (46.2 percent) reported that the diabetes program will help them with prevention of their diabetes long term. Some of the statements

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associated with this code were “I am able to advise my mother” and “I feel better and learned a lot of things like prevention.” Meanwhile, 30.8 percent simply reported that the program helped them. Others reported that it helped “a lot with my glucose,” “helped a lot with regards to food” and “practice exercises helped to control my weight, as well as the advice on nutrition.”

How happy were you with your weight loss at the close of the study, 17 December 2009?

A majority (53.8 percent) of the group reported that they were very happy with regard to their weight loss at the close of the study. The other 46.2 percent reported feeling okay or happy with their weight loss by the close of the study. One individual reported that “I would have liked to have lost more weight, but for how undisciplined I was, I obtained good results.” Another member stated that they were “90% happy.”

Have you been able to maintain your weight level as it was at the end of this study? A majority of respondents (92.3 percent) reported that they have been able to maintain their weight level to some extent with only one responding that she had not. Some stated that they have “lowered [their weight] more” or that they have lowered their weight more “with diet.” The one individual that responded in the negative reported that “no, wasn’t able to maintain because had moved addresses for a time.”

What was most difficult about fully participating in this study? For this final qualitative survey question, the majority of respondents (53.8 percent) reported that exercise was the most difficult aspect of fully participating in this study. Others stated that they “found the diet to be very difficult,” “time because of work,” “little difficult to integrate completely into the study for it to have counted for much” and one reported that “nothing was difficult.”

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Overall, the randomly selected participants reported in the positive for their experiences with regard to learning preventative measures such as life-style modifications including nutritional knowledge.

Hypothesis 1: A researcher-developed protocol of nutritional and lifestyle modification intervention will decrease patient glucose levels among Type II Diabetes Mellitus patients presenting at the JMA clinic during the treatment period.

Table 10 shows the distribution of pre-intervention and post-intervention outcomes for medication usage in Pre-Diabetic participants (n = 21). There were only two participants that had a change in medication: n1 who went from using no diabetic medication to using Glibenclamida and Metformin; and, n21 who went from using Metformin to not needing any diabetic medication. Figure 11 illustrates the change in blood glucose levels (mg/dl) in the pre-diabetic participants.

Table 11 shows the distribution of pre and post-intervention outcomes for medication usage in Type II Diabetic participants (n = 27). Amongst this group only one participant had a change in medication: n12 went from using no diabetic medication to using Glibenclamida and Metformin. Figure 12 illustrates the change in blood glucose levels (mg/dl) in the Type II Diabetic participants.

Table 12 shows the distribution of pre-intervention and post-intervention blood glucose means (mg/dl) of both pre-diabetic and Type II Diabetic participants. The table indicates that there was a significant change in Type II Diabetic blood glucose ($p < 0.05$). There was no significant decrease or increase in blood glucose levels for pre-diabetic participants post-

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intervention. Therefore, due to the significant change ($p < 0.05$) in blood glucose levels in Type
II Diabetic participants the hypothesis was accepted.

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	Participant	Medication	
		Pre-Intervention	Post-Intervention
Group 1	n1	None	Glibenclamida & Metformin
	n2	None	None
	n3	None	None
	n4	None	None
	n5	None	None
	n6	None	None
	n7	None	None
	n8	None	None
	n9	None	None
	n10	Glibenclamida & Metformin	Glibenclamida & Metformin
	n11	None	None
	n12	Glibenclamida	Glibenclamida
	n13	None	None
	n14	None	None
	n15	None	None
	n16	Glicemet	Glicemet
Group 2	n17	None	None
	n18	None	None
	n19	Metformin & Insulin	Metformin & Insulin
	n20	None	None
	n21	Metformin	None

Table 10: Distribution of Pre- and Post-Intervention Medication for Pre-Diabetic Participants (n = 21)

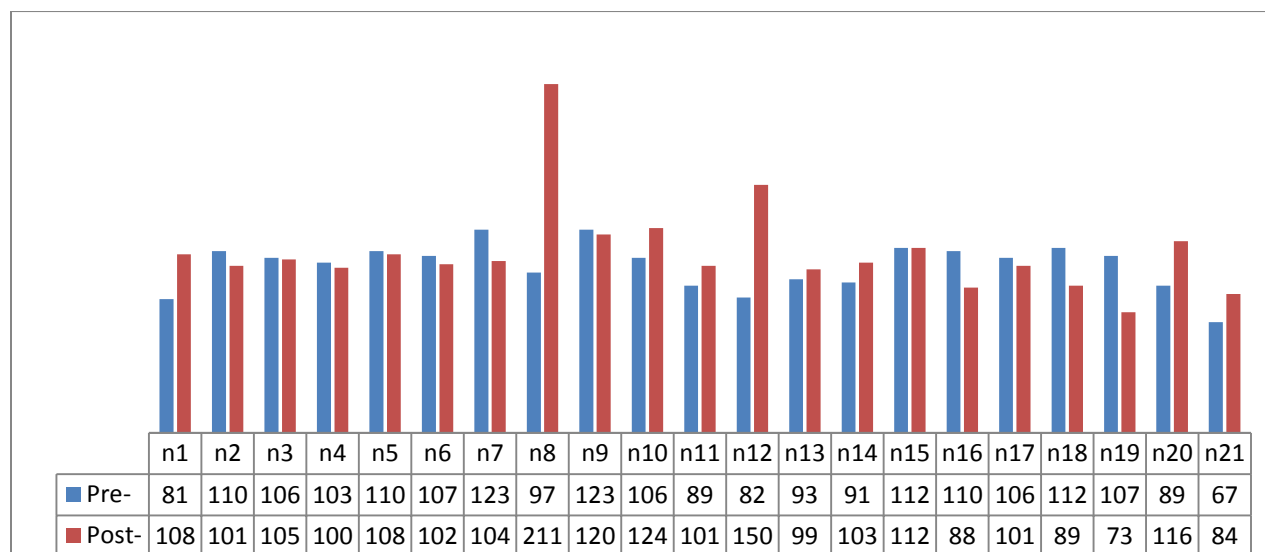


Figure 11: Distribution of Pre- and Post-Intervention Blood Glucose (mg/dl) for Pre-Diabetic Participants (n = 21)

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	Participant	Medication	
		Pre-	Post-
Group 1	n1	None	None
	n2	Glibenclamida & Metformin	Glibenclamida & Metformin
	n3	Glibenclamida & Metformin	Glibenclamida & Metformin
	n4	Glibenclamida	Glibenclamida
	n5	Glibenclamida & Metformin	Glibenclamida & Metformin
	n6	None	None
	n7	None	None
	n8	Glibenclamida	Glibenclamida
	n9	Glibenclamida & Metformin	Glibenclamida & Metformin
	n10	None	None
	n11	Glibenclamida & Metformin	Glibenclamida & Metformin
	n12	None	Glibenclamida & Metformin
	n13	Glibenclamida & Metformin	Glibenclamida & Metformin
	n14	Glibenclamida & Metformin	Glibenclamida & Metformin
	n15	Metformin & Insulin	Metformin & Insulin
	n16	Glibenclamida & Metformin	Glibenclamida & Metformin
	n17	None	None
	n18	Metformin	Metformin
	n19	Glibenclamida	Glibenclamida
	n20	Glibenclamida & Metformin	Glibenclamida & Metformin
Group 2	n21	None	None
	n22	Metformin & Insulin	Metformin & Insulin
	n23	Glibenclamida	Glibenclamida
	n24	Metformin	Metformin
	n25	None	None
	n26	Glibenclamida & Metformin	Glibenclamida & Metformin
	n27	None	None

Table 11: Distribution of Pre- and Post-Intervention Medication for Type II Diabetic Participants (n = 27)

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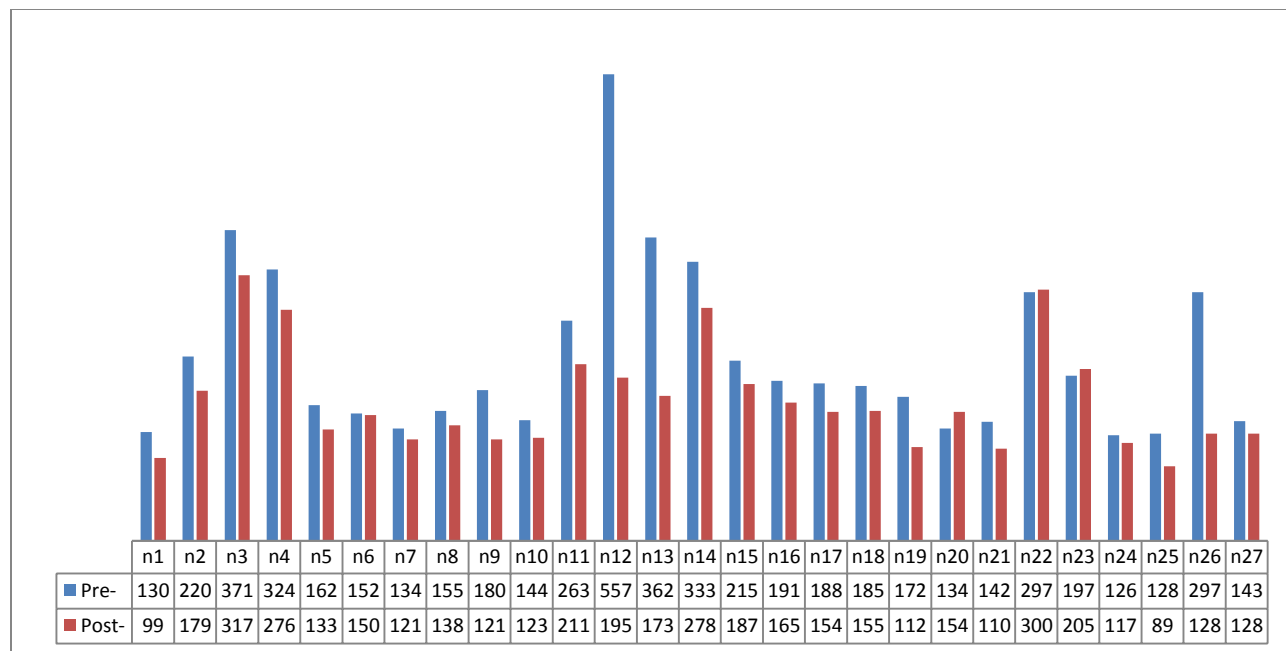


Figure 12: Distribution of Pre- and Post-Intervention Blood Glucose (mg/dl) for Type II Diabetic Participants (n = 27)

Outcomes	Pre-		Post-		P-value
	Mean	SD	Mean	SD	
Pre-Diabetic (< 125 mg/dl)	101.14	14.122	109.476	28.06	0.23
Blood Glucose (n = 21)					
Type II Diabetics (\geq 125 mg/dl)	218.59	102.19	167.333	62.202	0.031
Blood Glucose (n = 27)					

Table 12: Distribution of Pre- and Post-Intervention Scores for Pre-Diabetic and Type II Diabetic Participants (n = 48)

Hypothesis 2: A researcher-developed protocol of nutritional and lifestyle modification intervention will decrease weight by 5 percent among pre-diabetic and type II diabetes mellitus patients presenting at the JMA clinic by the end of the treatment period.

Table 13 shows the distribution of Pre-Intervention and Post-Intervention Weight (lbs.) scores. Table 13 breaks the scores down into overall population (n = 48), Group 1 (n = 36) and Group 2 (n = 12). Statistical analysis indicated that there was no significant change in post-intervention weight for any of the three categories listed ($p > 0.05$).

Table 14 shows the distribution of recorded Pre-Intervention and Post-Intervention weight (lbs.) for Group 1 participants (n = 36). Table 14 also shows the participants' percent change in weight. Three participants had no change in weight post-intervention. Nine participants had an increase in weight post-intervention; two of which showed an increase above 5 percent of their respective body weight (n17 and n34). Twenty-four participants had a decrease in weight post-intervention; one of which showed a decrease below 5 percent of their body weight (n33). This loss of percent weight is indicated by a negative symbol before the percentage change.

Table 15 shows the distribution of recorded pre and post-intervention weight (lbs.) for Group 2 participants (n = 12). Table 15 also shows the participants' percent change in weight. One participant had no change in their body weight post-intervention. Four participants had an increase in weight post-intervention; none showed an increase above 5 percent of their respective body weight. Seven participants had a decrease in weight post-intervention; two of which showed a decrease below 5 percent of their respective body weight (n6 and n8). This loss of percent weight is indicated by a negative symbol before the percentage change. Since there was

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no significant change ($p > 0.05$) in body weight for participants in this study the hypothesis was rejected.

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Outcomes	Pre-		Post-		P-value
	Mean	SD	Mean	SD	
Overall	165.96	37.60	164.15	36.99	0.81
Group 1	167.53	38.71	166.1667	38.00	0.88
Group 2	161.25	35.26	158.0833	34.64	0.83

Table 13: Distribution of Pre- and Post-Intervention Mean and Standard Deviation For Weight (lbs) of Overall Population (n = 48), Group 1 (n = 36) and Group 2 (n = 12)

n	Pre-Wt	Post-Wt	% Change	n	Pre-Wt	Post-Wt	% Change
n1	150	152	1.3%	n19	244	240	-1.6%
n2	153	150	-2.0%	n20	140	136	-2.9%
n3	208	205	-1.4%	n21	130	128	-1.5%
n4	162	160	-1.2%	n22	194	187	-3.6%
n5	179	176	-1.7%	n23	126	128	1.6%
n6	178	174	-2.2%	n24	168	174	3.6%
n7	178	178	0.0%	n25	122	120	-1.6%
n8	126	128	1.6%	n26	126	125	-0.8%
n9	158	154	-2.5%	n27	145	143	-1.4%
n10	134	132	-1.5%	n28	121	123	1.7%
n11	224	220	-1.8%	n29	207	200	-3.4%
n12	206	200	-2.9%	n30	274	271	-1.1%
n13	134	131	-2.2%	n31	204	200	-2.0%
n14	180	182	1.1%	n32	140	140	0.0%
n15	128	131	2.3%	n33	124	115	-7.3%
n16	155	154	-0.6%	n34	200	213	6.5%
n17	166	176	6.0%	n35	138	138	0.0%
n18	225	218	-3.1%	n36	184	180	-2.2%

Table 14: Distribution of Pre- and Post-Intervention Weight (lbs) for Group 1 Participants

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n	Pre-Wt	Post-Wt	% Change	n	Pre-Wt	Post-Wt	% Change
n1	166	168	1.2%	n7	250	240	-4.0%
n2	179	184	2.8%	n8	158	149	-5.7%
n3	162	158	-2.5%	n9	198	198	0.0%
n4	134	140	4.5%	n10	121	124	2.5%
n5	135	132	-2.2%	n11	134	130	-3.0%
n6	148	127	-14.2%	n12	150	147	-2.0%

Table 15: Distribution of Pre- and Post-Intervention Weight (lbs) for Group 2 Participants

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Summary

In summary, data provide findings in response to all the research objectives and hypotheses. Significance ($p < 0.05$) was isolated to the diabetic knowledge variable; while a positive change (1750 percent increase) was observed in the active category of the physical activity variable. Hypothesis one showed significance ($p < 0.05$) and was thereby accepted. Hypothesis two did not show significance ($p > 0.05$) and was thereby rejected. Chapter 5 provides additional discussion, summary, conclusions and recommendations.

Chapter Five

Summary, Discussion, Conclusions and Recommendations

The purpose of this study was to determine the prevalence of known risk factors associated with diabetes among JMA clinic patients in order to develop and test educational material and clinical interventions to reduce the incidence of pre-diabetes and uncontrolled type II Diabetes. The research objectives that were targeted in this study were:

Research Objectives

The objectives of this research were:

1. Determine the prevalence of Type II Diabetic patients who present at the James Moody Adams Clinic in Tegucigalpa, Honduras.
2. Determine the knowledge level of patients regarding their Type II Diabetes, via a pre- and post-test.
3. Determine and describe the relationship between the dependent variables (body mass index [BMI], blood glucose level, blood pressure, waist circumference, level of tobacco use, and level of depression) and the independent variables (age, gender, family history of diabetes, socio-demographical data [education level, level of income], literacy, and exercise regimen, medication, and diabetes knowledge).
4. Evaluate the effectiveness of the researcher-developed protocol for a nutritional and lifestyle modification intervention program to control Type II Diabetes.

There are two primary hypotheses guiding the research:

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Hypothesis 1: A researcher-developed protocol of nutritional and lifestyle modification intervention will decrease patient glucose levels among Type II Diabetes Mellitus patients presenting at the JMA clinic during the treatment period.

Hypothesis 2: A researcher-developed protocol of nutritional and lifestyle modification intervention will decrease weight by 5 percent among pre-diabetic and Type II Diabetes Mellitus patients presenting at the JMA clinic by the end of the treatment period.

Summary

Diabetes mellitus is one of the leading metabolic diseases and research has shown that Type II Diabetes Mellitus is the most prevalent form of this chronic non-communicable disease. Diabetes is also a great health concern that can lead to life-threatening complications if not properly controlled, such as: diabetic nephropathy, stroke, neuropathy, and hyperosmolar hyperglycemic nonketotic syndrome. Type II Diabetes Mellitus is also the leading cause of blindness in adults under the age of 75 and a leading cause (60 percent) of non-injury foot amputation cases. Individuals with diabetes mellitus have been shown to have a 200 percent greater chance of death compared to individuals without the condition of a similar age.

Diabetes has become a growing problem worldwide and the WHO has estimated that more than 220 million people worldwide have diabetes. They also predicted that this number would more than double by the year 2030. In addition, more than 80 percent of all diabetic related deaths worldwide occur in low- and middle-income countries, such as Honduras. This country is consistently described in literature as one of the poorest countries in the Western

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Hemisphere. It has also been indicated as the country that will see the greatest increase in diabetes among studied Central American nations by the Pan American Health Organization and WHO (Division of Disease Prevention And Control Program on Non-Communicable Diseases, 2002).

While there is much known about diabetes, the problem is pervasive and is creating a substantial drain on governmental health budgets and representing a challenge for medical professional staff to meet the needs of their patients. Unfortunately, there are not enough governmental programs or other agencies in Honduras conducting research, and financial resources seem to be given more to treatment and assistance rather than prevention and managed care. As described in Chapter 2 of this dissertation, studies have shown the importance and relevance of lifestyle modification in the prevention and management of diabetes mellitus. Both the WHO and IDF developed recommendations based on this evidence and research. They recommended improving understanding of this disease through education and changing one's lifestyle through improved diet and exercise.

Discussion

This study provided some compelling evidence that a Type II Diabetes prevention program utilizing researcher developed protocol for nutritional and lifestyle modification is feasible and effective in a Honduran community as was demonstrated by positive changes in diabetic knowledge and decrease in Type II Diabetic blood glucose levels. In addition, this program helped to change the exercise habit of the patients of the JMA clinic as seen by the 1750 percent increase in physical activity. As an effect of improved diabetic knowledge and increased exercise we saw a small decrease in body weight amongst the two groups – 1.97 percent

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decrease in Group 2 and a 0.81 percent decrease in Group 1 – and a 69.2 percent improvement in blood pressure readings. A majority of respondents (76.9 percent) elicited happiness in their respective weight loss at the end of this study on December 17, 2009. Some (30.8 percent) reported that they had been able to lower their weight more due to the lifestyle modifications they learned during this study. This success helps to show that implementation of a diabetes prevention program is effective.

However, due to the unforeseen political unrest which occurred in Honduras during the time of this study its scope is limited with respect to global recommendations. Much is already known about the importance of lifestyle modifications in the ongoing prevention and management of Type II Diabetes Mellitus which was also demonstrated in this study. This study has provided a base for future investigations concerning Type II Diabetes Mellitus in Tegucigalpa, Honduras.

Conclusions

Research objective one:

The *prevalence of Type II Diabetic patients* who presented at the James Moody Adams Clinic in Tegucigalpa, Honduras during the first phase of this research study was 15.27 percent which indicates a need for provision of chronic care of diabetes along with prevention.

Research objective two:

Participants involved in a diabetic program showed positive improvement ($p < 0.001$) in their diabetic knowledge as demonstrated in pretest-posttest diabetic knowledge questionnaire findings.

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Research objective three:

Demographics show that study participants represent the range of medical need for diabetes treatment and prevention. Average age of participants in this study was 50.15 (range of 21 to 75 years old). The majority of participants (75 percent) never attended high school – the two highest levels attained were third and sixth grade.

Research objective four:

1. Participation of 96 patients in this research study shows interest and willingness for those attending the JMA clinic to enroll in treatment and education programs.
2. Unforeseen political unrest which occurred in Honduras had an impact of 50 percent drop of enrolled participants which required IRB approval to make adjustments to ensure the viability of this research study.
3. Split feelings of respondents regarding the impact of political unrest indicate the varying response to uncertainty and implications for health care and participation in this study.
4. Curfews, protests, police clashing with demonstrators in the capital city where this study was taking place and even the Catholic Church cancelling mass and telling patrons to stay home help explain feelings of discomfort attending a voluntary program.
5. Previous level of education does not appear to be a primary concern in ability to increase diabetic knowledge among participants as reflected in responses such as “learned a lot of things like prevention” and “able to advise my mother”.

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6. The majority of respondents (76.9 percent) indicated the knowledge gained through participation in this study helped and will help them in their long term management and prevention of diabetes.

Hypothesis one:

Type II Diabetic participants in this diabetic program showed positive improvement ($p < 0.05$) in lowering their blood glucose levels as demonstrated in pre-/post-intervention findings.

Hypothesis two:

1. Participants in Group 2 showed a greater weight loss on average (3.17 lbs. lost) compared to Group 1 participants (1.36 lbs. lost) although not a significant change ($p > 0.05$).
2. There was not a 5 percent decrease in body weight or significant weight change ($p > 0.05$) as a result of this diabetes program. Thus, hypothesis two was rejected.

Recommendations

Future considerations for investigators wishing to conduct research in Tegucigalpa, Honduras should consider longitudinal studies that examine more long term effects of a diabetes prevention program. Developing methods aimed at motivating or enhancing the compliance of patients should also be examined to better understand how to motivate a low socioeconomic community. This may be difficult to do without addressing their socioeconomic and financial infrastructure. It is easy to show people the tools, but without the finances to acquire these tools it will be difficult to use them. Therefore, future studies should examine methods of involving

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governments in assisting people in becoming more self-reliant and capable of improving their own financial status. Future studies should also examine better methods to change dietary habits when the very foods they need, such as vegetables and fruits, may not be affordable.

Future studies should also probe self-reported changes in physical activity to determine the nature and effectiveness of the exercise program. Ideally, the reporting would include researcher observation or another means to either accompany or substitute for self-reporting. Since the expected weight loss in this study was not achieved as expected, future studies should change self-reporting to observed methods of the researcher interventions such as exercise.

This research study sought to investigate the relationship between depression and diabetes. Unfortunately, it was difficult to rule out the effects of the political unrest that transpired during this study in the capital city of Honduras. Therefore, I recommend that future investigators replicate this study and attempt to determine a correlational effect between the degree of depression and level of diabetes.

Overall, this study demonstrated that positive diabetic change was possible and that with continued use of educational materials and exercise regimens, the JMA clinic could feasibly conduct an effective and successful diabetic prevention center in Tegucigalpa, Honduras.

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References

- 14 of 15 Judges Said NO. (2009). *Honduras News*. Retrieved 27 November 2009, from <http://www.hondurasnews.com/14-of-15-judges-said-no/#more-3364>
- 60% Advancement in Talks. (2009). *Honduras News*. Retrieved 10 October 2009, from <http://www.hondurasnews.com/60-advancement-in-talks/#more-2736>
- About.com. (2009). *Exercise*. Retrieved April 27, 2009 from <http://exercise.about.com/library/blsquatFAQ.htm>.
- ALBA Delivers More Sanctions for Honduras. (2009). *Honduras News*. Retrieved 18 October 2009, from <http://www.hondurasnews.com/alba-delivers-more-sanctions-for-honduras/#more-2863>
- Alberti, K.G.M.M., Zimmet, P., Shaw, J., (2007). International Diabetes Federation: a consensus on Type 2 diabetes prevention. *Diabetic Medicine*, 24, 451-463.
- Alis, K., Penhaul, K., Starr, B., & Labott, E. (2009). Ousted president vows to return to Honduras. *CNN*. Retrieved 2 July 2009, from <http://www.cnn.com/2009/WORLD/americas/06/30/honduras.political.turmoil/index.html?iref=allsearch>
- Ambassador Problem for Argentina. (2009). *Honduras News*. Retrieved 15 August 2009, from <http://www.hondurasnews.com/ambassador-problem-for-argentina/#more-2150>
- Ambassadors Being Expelled. (2009). *Honduras News*. Retrieved 23 August 2009, from <http://www.hondurasnews.com/ambassadors-being-expelled/#more-2196>
- American Diabetes Association [ADA]. (2008). Standards of Medical Care in Diabetes – 2008. *Diabetes Care*, 31 Supp 1, S12-S54.

- Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute
- Amnesty Int'l Claims Abuse in Honduras. (2009). *Honduras News*. Retrieved 20 August 2009, from <http://www.hondurasnews.com/amnesty-intl-claims-abuse-in-honduras/#more-2180>
- Anderson, Ryan J., Freedland, Kenneth E., Clouse, Ray E., Lustman, Patrick J. (2001). The Prevalence of Comorbid Depression in Adults With Diabetes. *Diabetes Care*. 24:6, 1069-1078.
- Argentine Diplomats Must Leave Honduras. (2009). *Honduras News*. Retrieved 19 August 2009, from <http://www.hondurasnews.com/argentine-diplomats-must-leave-honduras/#more-2174>
- Arias Meets Wednesday With Presidential Hopefuls. (2009). *Honduras News*. Retrieved 15 September 2009, from <http://www.hondurasnews.com/arias-meets-wednesday-with-presidential-hopefuls/#more-2402>
- Association Amicus. (2009a). *About Baxter Institute*. Retrieved March 12, 2009 from <http://www.associationamicus.com/content.asp?SID=1331&CID=90733>.
- Association Amicus. (2009b). *About JMA Clinic*. Retrieved March 12, 2009 from <http://www.associationamicus.com/content.asp?SID=1331&CID=90755>.
- Attorney General Attacked Saturday Night. (2009). *Honduras News*. Retrieved 9 November 2009, from <http://www.hondurasnews.com/attorney-general-attacked-saturday-night/>
- Beekman, A.T.F., Deeg, D.J.H., Van Limbeek, J., Braam, A.W., De Vries, M.Z., Van Tilburg, W. (1997). Criterion Validity of the Center for Epidemiologic Studies Depression Scale (CES-D₁₀): Results From a Community-Based Sample of Older Subjects in the Netherlands. *Psychological Medicine*, 27:1, 231-235.
- Beers, Mark H., Berkow, Robert (Eds.). (1999). *The Merck Manual of Diagnosis and Therapy (17th Edition)*. Whitehouse Station, N.J.: Merck Research Laboratories.

- Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute
- “Body Mass Index.” (2009). CDC. Retrieved March 2, 2009 from
www.cdc.gov/healthyweight/assessing/bmi/
- Bomb Lab Found. (2009). *Honduras News*. Retrieved 29 November 2009, from
<http://www.hondurasnews.com/bomb-lab-found/#more-3392>
- Bomb Thrown in Tegucigalpa. (2009). *Honduras News*. Retrieved 3 September 2009, from
<http://www.hondurasnews.com/bomb-thrown-in-tegucigalpa/#more-2260>
- Border Curfew Extended. (2009). *Honduras News*. Retrieved 27 July 2009, from
<http://www.hondurasnews.com/border-curfew-extended/#more-2036>
- Boyles, Salynn (Reviewed by Chang, Louise). (2007). *Diabetes Complications Cost Billions*. Retrieved June 16, 2008 from
<http://www.emedicinehealth.com/script/main/art.asp?articlekey=80414>.
- Brazil and Argentina Won't Support Elections. (2009). *Honduras News*. Retrieved 19 November 2009, from <http://www.hondurasnews.com/brazil-and-argentina-wont-support-elections/#more-3274>
- Brice, A. (2009). Police clash with demonstrators in Honduran capital. *CNN*. Retrieved 30 June 2009, from
<http://www.cnn.com/2009/WORLD/americas/06/29/honduras.president.arrested/index.html?iref=allsearch>
- Brown University (2000). *Center for Epidemiologic Studies Depression Scale (CES-D)*, NIMH. Retrieved March 28, 2009 from <http://www.chcr.brown.edu/pcoc/cesdscale>
- Carter urges resolution to Honduran crisis. (2009). *CNN*. Retrieved 24 September 2009, from
http://articles.cnn.com/2009-09-24/world/honduras.carter_1_president-zelaya-president-roberto-micheletti-brazilian-embassy?_s=PM:WORLD

- Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute
- Catholic Church Cancels Mass. (2009). *Honduras News*. Retrieved 29 June 2009, from <http://www.hondurasnews.com/ballot-boxes-being-removed/#more-1706>
- Catholic Church Speaks Out. (2009). *Honduras News*. Retrieved 29 June 2009, from <http://www.hondurasnews.com/catholic-church-speaks-out/>
- Centers for Disease Control and Prevention Primary Prevention Working Group [CDC WG]. (2004). Primary Prevention of Type 2 Diabetes Mellitus by Lifestyle Intervention: Implications for Health Policy. *Annals of Internal Medicine*, 140:11, 951-957.
- Central America Be On Guard. (2009). *Honduras News*. Retrieved 29 June 2009, from <http://www.hondurasnews.com/central-america-be-on-guard/#more-1624>
- Central Americans Observe Happiness. (2009). *Honduras News*. Retrieved 30 November 2009, from <http://www.hondurasnews.com/central-americans-observe-happiness/#more-3412>
- Central Intelligence Agency: The World Factbook [CIA WFB]. (2009). *Honduras*. Retrieved March 2, 2009 from <https://www.cia.gov/library/publications/the-world-factbook/geos/ho.html>.
- Chandler, Gary, & Prado, Liza. (2007). *Honduras & The Bay Island (1st Edition)*. Oakland, CA: Lonely Planet Publications.
- Chavez Backs Mel. (2009). *Honduras News*. Retrieved 29 June 2009, from <http://www.hondurasnews.com/chavez-backs-mel/#more-1672>
- Chavez Will Intervene With Force. (2009). *Honduras News*. Retrieved 29 June 2009, from <http://www.hondurasnews.com/chavez-will-intervene-with-force/>
- Clinton: Costa Rican to mediate Honduras crisis. (2009). *Deseret News*. Retrieved 9 July 2009, from <http://www.deseretnews.com/article/705315366/Clinton-Costa-Rican-to-mediate-Honduras-crisis.html>

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute

Congress Final Vote – 111 to 14. (2009). *Honduras News*. Retrieved 3 December 2009, from <http://www.hondurasnews.com/congress-final-vote-111-to-14/#more-3490>

Craig Kelly Leaves Honduras. (2009). *Honduras News*. Retrieved 19 November 2009, from <http://www.hondurasnews.com/craig-kelly-leaves-honduras/#more-3270>

Crandall, Jill, Schade, David, Ma, Yong, Fujimoto, Wilfred Y., Barrett-Connor, Elizabeth, Fowler, Sarah, Dagogo-Jack, Sam, Andres, Reubin. (2006). The Influence of Age on the Effects of Lifestyle Modification and Metformin in Prevention of Diabetes. *J Gerontol A Biol Sci Med Sci*, 61:10, 1075-1081.

CSJ Will Not Issue Opinion on Zelaya. (2009). *Honduras News*. Retrieved 10 November 2009, from <http://www.hondurasnews.com/csj-will-not-issue-opinion-on-zelaya/#more-3163>

Curfew Extended – 6pm Wednesday. (2009). *Honduras News*. Retrieved 23 September 2009, from <http://www.hondurasnews.com/curfew-extended-6-pm-wednesday/#more-2546>

Curfew Extended. (2009). *Honduras News*. Retrieved 23 September 2009, from <http://www.hondurasnews.com/curfew-extended/#more-2531>

Curfew Imposed in Honduras. (2009). *Honduras News*. Retrieved 29 June 2009, from <http://www.hondurasnews.com/curfew-imposed-in-honduras/>

Curfew in Effect All Day Tuesday. (2009). *Honduras News*. Retrieved 22 September 2009, from <http://www.hondurasnews.com/curfew-in-effect-all-day-tuesday/#more-2498>

Curfew In Place Again This Evening. (2009). *Honduras News*. Retrieved 28 September 2009, from <http://www.hondurasnews.com/2009/09/page/6/>

Curfew in Tegucigalpa. (2009). *Honduras News*. Retrieved 13 August 2009, from <http://www.hondurasnews.com/curfew-in-tegucigalpa/#more-2130>

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute

Curfew Suspended Until Further Notice. (2009). *Honduras News*. Retrieved 25 September 2009, from <http://www.hondurasnews.com/curfew-suspended-until-further-notice/#more-2551>

Curfew Tonight – 10pm to 5am. (2009). *Honduras News*. Retrieved 30 September 2009, from <http://www.hondurasnews.com/curfew-tonight-10pm-to-5am/>

Deal struck to end Honduran leadership standoff. (2009). *CNN*. Retrieved 1 November 2009, from http://articles.cnn.com/2009-10-29/world/honduras.talks_1_honduran-president-manuel-zelaya-president-roberto-micheletti-military-backed-coup?_s=PM:WORLD

Deputy Defense Minister's Dad Kidnapped. (2009). *Honduras News*. Retrieved 28 October 2009, from <http://www.hondurasnews.com/deputy-defense-ministers-dad-kidnapped/#more-2990>

Destructive Protests Continue. (2009). *Honduras News*. Retrieved 13 August 2009, from <http://www.hondurasnews.com/destructive-protests-continue/#more-2138>

Diabetes Prevention Program Research Group, The. (2006). Relationship of Body Size and Shape to the Development of Diabetes in the Diabetes Prevention Program. *Obesity (Silver Spring)*, 14:11, 2107-2117.

Diabetes Prevention Program Research Group [DPP RG]. (2002). Reduction in the Incidence of Type 2 Diabetes with Lifestyle Intervention or Metformin. *N Engl J Med*, 346:6, 393-403.

Dictionary.com. (2009). *Latino*. Retrieved March 3, 2009 from <http://dictionary.reference.com/browse/Latino>.

Division of Disease Prevention And Control Program on Non-Communicable Diseases. (2002). The Central America Diabetes Initiative (CAMDI): Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua. *Pan American Health Organization/World Health*

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute

Organization. Retrieved February 10, 2009 from

<http://www.paho.org/English/ad/dpc/nc/camdi-proposal-1.pdf>.

DOCUMENT - HONDURAS: HUMAN RIGHTS CRISIS THREATENS AS REPRESSION

INCREASES. (2009) *Amnesty International*. Retrieved 15 January 2011, from

<http://www.amnesty.org/en/library/asset/AMR37/004/2009/en/fa065539-1131-49d1-85d2-6a2b84a30c6b/amr370042009eng.html>

Dunstan, David W., Zimmet, Paul, Slade, Renee, Harper, Stephanie, Burke, Linda. (2003). The joint position statement of the International Diabetes Institute and Diabetes Australia – Victoria on the role of physical activity in the risk reduction and management of diabetes. *International Diabetes Institute*. 1-8

Dunstan, David W., Zimmet, Paul Z., Welborn, Timothy A., De Courten, Maximilian P., Cameron, Adrian J., Sicree, Richard A., Dwyer, Terry, Colagiuri, Stephen, Jolley, Damien, Knuiaman, Mathew, Atkins, Rober, Shaw, Jonathan E., On Behalf of the AusDiab Steering Committee. (2002). The Rising Prevalence of Diabetes and Impaired Glucose Tolerance: The Australian Diabetes, Obesity and Lifestyle Study. *Diabetes Care*, 25:5, 829-834.

Earthquake Hits Honduras – 5.3. (2009). *Honduras News*. Retrieved 19 October 2009, from

<http://www.hondurasnews.com/earthquake-hits-honduras-5-3/#more-2878>

Earthquake in Honduras. (2009). *Honduras News*. Retrieved 21 July 2009, from

<http://www.hondurasnews.com/earthquake-in-honduras/#more-2004>

Earthquake in Honduras. (2009). *Honduras News*. Retrieved 11 October 2009, from

<http://www.hondurasnews.com/earthquake-in-honduras-2/>

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute

Earthquakes Felt in Honduras. (2009). *Honduras News*. Retrieved 22 October 2009, from

<http://www.hondurasnews.com/earthquake-felt-in-honduras-2/#more-2917>

Earthquakes in Honduras. (2009). *Honduras News*. Retrieved 7 August 2009, from

<http://www.hondurasnews.com/earthquakes-in-honduras/#more-2098>

Edward Via Virginia College of Osteopathic Medicine. (2009). *Medical Mission/Outreach:*

Honduras. Retrieved March 10, 2009 from

<http://www.vcom.vt.edu/outreach/honduras.html>.

El Heraldo Victim of Attack. (2009). *Honduras News*. Retrieved 16 August 2009, from

<http://www.hondurasnews.com/el-heraldo-victim-of-attack/#more-2163>

Emergency Decree Repealed. (2009). *Honduras News*. Retrieved 6 October 2009, from

<http://www.hondurasnews.com/emergency-decree-repealed/#more-2707>

Encyclopedia Britannica. (2009). *Honduras*. Retrieved March 11, 2009 from

<http://www.britannica.com/EBchecked/topic/270769/Honduras>.

Encyclopedia of the Nations. (2008). *Honduras*. Retrieved March 11, 2009 from

<http://www.nationsencyclopedia.com/economies/Americas/Honduras.html>.

Engum, Anne, Mykletun, Arnstein, Midthjell, Kristian, Holen, Are, Dahl, Alv A. (2005).

Depression and Diabetes: A large population-based study of sociodemographic, lifestyle, and clinical factors associated with depression in type 1 and type 2 diabetes. *Diabetes Care*. 28:8, 1904-1909.

Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, The [Expert Committee DM]. (2002). Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care*, 25 Supp 1, S5-S20.

- Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute
- Faul, F., Erdefelder, E. (1992). GPOWER: A priori, post-hoc, and compromise power analyses for MS-DOS [Computer program]. Bonn, Germany: Bonn University, Dep. of Psychology.
- FINNALLY! US Travel Alert Honduras Revised!. (2009). *Honduras News*. Retrieved 7 November 2009, from <http://www.hondurasnews.com/finally-us-travel-alert-for-honduras-revised/#more-3133>
- Fisher, Lawrence, Chesla, Catherine A., Mullan, Joseph T., Skaff, Marilyn M., Kanter, Richard A. (2001). Contributors to Depression in Latino and European-American Patients With Type 2 Diabetes. *Diabetes Care*, 24:10, 1751-1757.
- Garcia, Alexandra A., Villagomez, Evangelina T., Brown, Sharon A., Kouzekanani, Kamiar, Hanis, Craig L. (2001). The Starr County Diabetes Education Study: Development of the Spanish-language diabetes knowledge questionnaire. *Diabetes Care*, 24:1, 16-21.
- Gas Price Increase. (2009). *Honduras News*. Retrieved 24 November 2009, from <http://www.hondurasnews.com/gas-price-increase/#more-3319>
- General Assembly condemns coup in Honduras. (2009). *United Nations*. Retrieved 3 July 2009, from <http://www.un.org/apps/news/story.asp?NewsID=31314&Cr=honduras&Cr1>
- Goroll, Allan H., Mulley Jr., Albert G., (2000). *Primary Care Medicine: Office Evaluation and Management of the Adult Patient (4th Edition)*. Philadelphia: Lippincott Williams & Wilkins.
- Government Removes Zelaya's Perks. (2009). *Honduras News*. Retrieved 6 July 2009, from <http://www.hondurasnews.com/government-removes-zelayas-perks/#more-1884>
- Grenade at Substation of Enee. (2009). *Honduras News*. Retrieved 16 November 2009, from <http://www.hondurasnews.com/grenade-at-substation-of-enee/#more-3237>

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute

Grenade Goes Off in La Ceiba. (2009). *Honduras News*. Retrieved 27 November 2009, from <http://www.hondurasnews.com/laceiba-airport-hit-by-grenade/#more-3366>

Grenade Intended for Ballot Boxes Off Target. (2009). *Honduras News*. Retrieved 14 November 2009, from <http://www.hondurasnews.com/grenade-intended-for-ballot-boxes-off-target/#more-3217>

History of Honduras. (2009). Retrieved March 5, 2009 from <http://honduras.com/history/>.

Health Workers Join Strike. (2009). *Honduras News*. Retrieved 8 August 2009, from <http://www.hondurasnews.com/health-workers-join-strike/#more-2105>

Honduran Cardinal Asks for Unity. (2009). *Honduras News*. Retrieved 17 July 2009, from <http://www.hondurasnews.com/honduran-cardinal-asks-for-unity/#more-1962>

Honduran Congress names provisional president. (2009). *CNN*. Retrieved 29 June 2009, from <http://www.cnn.com/2009/WORLD/americas/06/28/honduras.president.arrested/index.html?iref=allsearch>

Honduran military prevents ousted leader's landing; clash kills 1. (2009). *CNN*. Retrieved 6 July 2009, from http://articles.cnn.com/2009-07-05/world/honduras.political.turmoil_1_zelaya-president-roberto-micheletti-protesters?_s=PM:WORLD

Hondurans Enthusiastic Today. (2009). *Honduras News*. Retrieved 30 November 2009, from <http://www.hondurasnews.com/hondurans-enthusiastic-today/#more-3407>

Honduras Files with International Court of Justice. (2009). *Honduras News*. Retrieved 29 November 2009, from <http://www.hondurasnews.com/honduras-files-with-international-court-of-justice/#more-3380>

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute

Honduras Flu Cases Increase. (2009). *Honduras News*. Retrieved 12 August 2009, from

<http://www.hondurasnews.com/honduras-flu-cases-increase/#more-2120>

Honduras heads toward crisis over referendum. (2009). *Miami Herald*. Retrieved 29 June 2009,

from <http://www.miamiherald.com/news/americas/story/1113513.html>

Honduras president challenges government over referendum. (2009). *CNN*. Retrieved 29 June 2009, from

<http://www.cnn.com/2009/WORLD/americas/06/25/honduras.general/index.html?iref=allsearch>

Honduras president: Nation calm before controversial vote. (2009). *CNN*. Retrieved 29 June 2009, from

<http://www.cnn.com/2009/WORLD/americas/06/27/honduras.zelaya/index.html?iref=allssearch>

Honduras revisits emergency decree as frustrations mount. (2009). *CNN*. Retrieved 29

September 2009, from http://articles.cnn.com/2009-09-28/world/honduras.president_1_roberto-micheletti-emergency-decree-honduras?_s=PM:WORLD

Honduras Withdraws from OAS. (2009). *Honduras News*. Retrieved 6 July 2009, from

<http://www.hondurasnews.com/honduras-withdraws-from-oas/#more-1878>

Honduras' Economy Hit Hard. (2009). *Honduras News*. Retrieved 23 July 2009, from

<http://www.hondurasnews.com/honduras-economy-hit-hard/#more-2011>

Honduras' leaders push back after Brazilian Embassy snub. (2009). *CNN*. Retrieved 28

September 2009, from <http://articles.cnn.com/2009-09->

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute

[27/world/honduras.president_1_brazilian-embassy-government-of-roberto-micheletti-honduran-capital?s=PM:WORLD](http://www.president1brazilianembassygovernmentofroberto-micheletti-honduran-capital?s=PM:WORLD)

“Hyperglycemia.” (2009). The Free Dictionary by Farlex. Retrieved March 1, 2009 from

<http://medical-dictionary.thefreedictionary.com/hyperglycemia>

Impeachment Hearings Being Held. (2009). *Honduras News*. Retrieved 29 June 2009, from

<http://www.hondurasnews.com/military-hands-over-materials/>

Interim leader announces unity government for Honduras. (2009). *CNN*. Retrieved 7 November

2009, from http://articles.cnn.com/2009-11-06/world/honduras.government_1_unity-government-micheletti-honduras?s=PM:WORLD

Israel Recognizes Honduras Elections. (2009). *Honduras News*. Retrieved 30 November 2009,

from <http://www.hondurasnews.com/israel-recognizes-honduras-elections/#more-3405>

Katon, Wayne J., Rutter, Carolyn, Simon, Greg, Lin, Elizabeth H.B., Ludman, Evette,

Ciechanowski, Paul, Kinder, Leslie, Young, Bessie, Von Korff, Michael. (2005). The Association of Comorbid Depression With Mortality in Patients With Type 2 Diabetes. *Diabetes Care*, 28:11, 2668-2672.

Klein, Samuel, Sheard, Nancy F., Pi-Sunyer, Xavier, Daly, Anne, Wylie-Rosett, Judith,

Kulkarni, Karmeen, Clark, Nathaniel G., (2004). Weight management through lifestyle modification for the prevention and management of type 2 diabetes: rationale and strategies. A statement of the American Diabetes Association, the North American Association for the Study of Obesity, and the American Society for Clinical Nutrition. *Am J Clin Nutr*, 80, 257-263.

Koetke, Carol, Doyle, Rita M. (Eds.). (2005). *Handbook of Pathophysiology* (2nd Edition).

Philadelphia: Lippincott Williams & Wilkins.

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute

La Tribuna Victim of Attack. (2009). *Honduras News*. Retrieved 16 August 2009, from

<http://www.hondurasnews.com/la-tribuna-victim-of-attack/#more-2165>

Lifestyle and nutritional management. (2006). *Diabetes Voice*, 51, 12-14.

Lindström, Jaana, Eriksson, Johan G., Valle, Timo T., Aunola, Sirkka, Cepaitis, Zygimantas, Hakumäki, Martti, Hämäläinen, Helena, Ilanne-Parikka, Pirjo, Keinänen-Kiukaanniemi, Sirkka, Laakso, Mauri, Louheranta, Anne, Mannelin, Marjo, Martikkala, Vesa, Moltchancov, Vladislav, Rastas, Merja, Salminen, Virpi, Sundvall, Jouko, Uusitupa, Matti, Tuomilehto, Jaakko. (2003). Prevention of Diabetes Mellitus in Subjects with Impaired Glucose Tolerance in the Finnish Diabetes Prevention Study: Results From a Randomized Clinical Trial. *J Am Soc Nephrol*, 14, S108-S113.

Mayo Clinic Staff, The. (2009). *Diabetic ketoacidosis*. Retrieved March 1, 2009 from

<http://www.mayoclinic.com/health/diabetic-ketoacidosis/DS00674>

Mayo Clinic Staff, The. (2009). *Prediabetes*. Retrieved March 2, 2009 from

<http://www.mayoclinic.com/health/prediabetes/DS00624>.

Mayo Clinic Staff, The. (2009). *Type 2 Diabetes: Symptoms*. Retrieved on March 1, 2009 from

<http://www.mayoclinic.com/health/type-2-diabetes/DS00585/DSECTION=symptoms>.

Medical Dictionary. (2009). *Glucometer*. Retrieved on April 17, 2009 from [http://medical-](http://medical-dictionary.thefreedictionary.com/Glucometer)

[dictionary.thefreedictionary.com/Glucometer](http://medical-dictionary.thefreedictionary.com/Glucometer).

MedicineNet.com. (2009). *Definition of Blood glucose*. Retrieved March 1, 2009 from

<http://www.medterms.com/scip/main/art.asp?articlekey=32858>.

Mejia Wants to Turn Himself In. (2009). *Honduras News*. Retrieved 14 November 2009, from

<http://www.hondurasnews.com/mejia-wants-to-turn-himself-in/>

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute

Mel Loses His Cool. (2009). *Honduras News*. Retrieved 29 June 2009, from

<http://www.hondurasnews.com/mel-loses-his-cool/>

Mel Speaks. (2009). *Honduras News*. Retrieved 29 June 2009, from

<http://www.hondurasnews.com/mel-speaks/>

Micheletti Applauds the Honduran Military. (2009). *Honduras News*. Retrieved 11 December 2009, from [http://www.hondurasnews.com/micheletti-applauds-the-honduran-](http://www.hondurasnews.com/micheletti-applauds-the-honduran-military/#more-3545)

[military/#more-3545](http://www.hondurasnews.com/micheletti-applauds-the-honduran-military/#more-3545)

Micheletti Returns to Honduras. (2009). *Honduras News*. Retrieved 10 July 2009, from

<http://www.hondurasnews.com/micheletti-returns-to-honduras/#more-1930>

Micheletti, R. (2009). The Path Forward for Honduras. *Wall Street Journal*. Retrieved 28 July 2009, from

<http://online.wsj.com/article/SB10001424052970204886304574311083177158174.html>

Micheletti's Nephew Assassinated. (2009). *Honduras News*. Retrieved 27 October 2009, from

<http://www.hondurasnews.com/michelettis-nephew-assassinated/#more-2977>

Micheletti's New Proposal. (2009). *Honduras News*. Retrieved 20 October 2009, from

<http://www.hondurasnews.com/michelettis-new-proposal/#more-2887>

Military Colonel Assassinated in Tegucigalpa. (2009). *Honduras News*. Retrieved 27 October

2009, from <http://www.hondurasnews.com/military-colonel-assassinated-in-tegucigalpa/>

Mohan, Viswanathan, Pradeepa, Rajendra. (2007). Redesigning the urban environment to promote physical activity in Southern India. *Diabetes Voice*, 52:1, 33-35.

Molitch, Mark E., Fujimoto, Wilfred, Hamman, Richard F., Knowler, William C., (2003). The Diabetes Prevention Program and Its Global Implications. *J Am Soc Nephrol*, 14, S103-S107.

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute

More Zelaya Protests. (2009). *Honduras News*. Retrieved 27 September 2009, from <http://www.hondurasnews.com/more-zelaya-protests/#more-2602>

MP Says No to Zelaya Reinstatement. (2009). *Honduras News*. Retrieved 26 November 2009, from <http://www.hondurasnews.com/mp-says-no-to-zelaya-reinstatement/#more-3349>

Munden, Julie (Ed.). (2006). *Anatomical Chart Company: Atlas of Pathophysiology (2nd Edition)*. Philadelphia: Lippincott Williams & Wilkins.

National Climatic Data Center. (2009). *Mitch: The Deadliest Atlantic Hurricane Since 1780*. Retrieved March 9, 2009 from <http://lwf.ncdc.noaa.gov/oa/reports/mitch/mitch.html>.

New Curfew. (2009). *Honduras News*. Retrieved 27 September 2009, from <http://www.hondurasnews.com/new-curfew/#more-2612>

New Curfews. (2009). *Honduras News*. Retrieved 26 September 2009, from <http://www.hondurasnews.com/new-curfews/>

Nicaragua Denies Airspace. (2009). *Honduras News*. Retrieved 10 July 2009, from <http://www.hondurasnews.com/nicaragua-denies-airspace/#more-1919>

Nicaragua May Expel Mel. (2009). *Honduras News*. Retrieved 27 July 2009, from <http://www.hondurasnews.com/nicaragua-may-expel-mel/#more-2042>

Nichols, Gregory A., Brown, Jonathan B. (2003). Unadjusted and Adjusted Prevalence of Diagnosed Depression in Type 2 Diabetes. *Diabetes Care*. 26:3, 744-749.

OAS Asks for Zelaya to be Moved. (2009). *Honduras News*. Retrieved 11 October 2009, from <http://www.hondurasnews.com/oas-asks-for-zelaya-to-be-moved/>

OAS Delegation Announced. (2009). *Honduras News*. Retrieved 8 August 2009, from <http://www.hondurasnews.com/oas-delegation-announced/#more-2114>

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute

OAS in Honduras for One Week. (2009). *Honduras News*. Retrieved 25 August 2009, from <http://www.hondurasnews.com/oas-in-honduras-for-one-week/#more-2209>

OAS Mission to Arrive Wednesday. (2009). *Honduras News*. Retrieved 7 October 2009, from <http://www.hondurasnews.com/oas-mission-to-arrive-wednesday/#more-2711>

OAS Moves to Suspend Honduras. (2009). *Honduras News*. Retrieved 6 July 2009, from <http://www.hondurasnews.com/oas-moves-to-suspend-honduras/>

OAS Still Wants Zelaya Back. (2009). *Honduras News*. Retrieved 25 August 2009, from <http://www.hondurasnews.com/oas-still-wants-zelaya-back/#more-2215>

Order for President's Capture. (2009). *Honduras News*. Retrieved 29 June 2009, from <http://www.hondurasnews.com/order-for-presidents-capture/>

Ousted Honduran leader sets Monday deadline on counteroffer. (2009). *CNN*. Retrieved 17 October 2009, from <http://edition.cnn.com/2009/WORLD/americas/10/16/honduras.zelaya/>

Ousted Honduran president rejects upcoming election. (2009). *CNN*. Retrieved 16 November 2009, from http://articles.cnn.com/2009-11-15/world/honduras.zelaya_1_zelaya-honduran-people-unity-government?_s=PM:WORLD

Peláez, Martha, Vega, Enrique. (2006). Old age, poverty and the chronic disease epidemic in Latin America and the Caribbean. *Diabetes Voice*, 51:4, 30-33.

Penhaul, K. (2009). Honduras' new leaders reject appeal for Zelaya's return. *CNN*. Retrieved 6 July 2009, from <http://www.cnn.com/2009/WORLD/americas/07/04/honduras.coup/index.html?iref=allse>
[arch](#)

- Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute
- Pittas, Anastassios G., (2003). Nutrition Interventions for Prevention of Type 2 Diabetes and the Metabolic Syndrome. *Nutr Clin Care*, 6:2, 79-88.
- Plug Will Be Pulled if Stations Incite National Hate. (2009). *Honduras News*. Retrieved 11 October 2009, from <http://www.hondurasnews.com/plug-will-be-pulled-if-stations-incite-national-hate/#more-2766>
- Police Crackdown on Terrorists. (2009). *Honduras News*. Retrieved 26 November 2009, from <http://www.hondurasnews.com/police-crackdown-on-terrorists/#more-3335>
- Pope Speaks of Honduras. (2009). *Honduras News*. Retrieved 14 July 2009, from <http://www.hondurasnews.com/pope-speaks-of-honduras/#more-1956>
- Power Out in Tegucigalpa. (2009). *Honduras News*. Retrieved 29 June 2009, from <http://www.hondurasnews.com/power-out-in-tegucigalpa/>
- President Roberto Micheletti Addresses Honduras. (2009). *Honduras News*. Retrieved 20 November 2009, from <http://www.hondurasnews.com/president-roberto-micheletti-addressing-honduras/>
- Printing of Election Ballots Begins in Honduras. (2009). *Honduras News*. Retrieved 22 October 2009, from <http://www.hondurasnews.com/printing-of-election-ballots-begins-in-honduras/#more-2903>
- Protest Clampdown. (2009). *Honduras News*. Retrieved 7 August 2009, from <http://www.hondurasnews.com/protest-clampdown/#more-2094>
- Protests Escalate. (2009). *Honduras News*. Retrieved 1 August 2009, from <http://www.hondurasnews.com/protests-escalate/#more-2073>
- Protesters Attack VP of Congress. (2009). *Honduras News*. Retrieved 14 August 2009, from <http://www.hondurasnews.com/protesters-attack-vp-of-congress/#more-2146>

- Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute
- Protesters in Tegucigalpa Ignore Curfew. (2009). *Honduras News*. Retrieved 23 September 2009, from <http://www.hondurasnews.com/protesters-in-tegucigalpa-ignore-curfew/#more-2507>
- Protestors Take Over School. (2009). *Honduras News*. Retrieved 11 September 2009, from <http://www.hondurasnews.com/protestors-take-over-school/#more-2351>
- Protests Hurt Honduras. (2009). *Honduras News*. Retrieved 5 August 2009, from <http://www.hondurasnews.com/protests-hurt-honduras/#more-2088>
- Radio HRN Attacked Last Night. (2009). *Honduras News*. Retrieved 6 November 2009, from <http://www.hondurasnews.com/radio-hrn-attacked-last-night/#more-3096>
- Radloff, Lenore Sawyer. (1977). The CES-D Scale: A Self-Report Depression Scale for Research in the General Population. *Applied Psychological Measurement*, 1:3, 385-401.
- Resistance Abandons Zelaya. (2009). *Honduras News*. Retrieved 4 December 2009, from <http://www.hondurasnews.com/resistance-abandons-zelaya/#more-3501>
- Resistance Demonstrations Continue. (2009). *Honduras News*. Retrieved 23 October 2009, from <http://www.hondurasnews.com/resistance-demonstrations-continue/#more-2918>
- Schmidt, B., & Martinez, A.R., (2009). Honduras Curfew Costs Economy \$50 Million Daily, Canahuati Says. *Bloomberg*. Retrieved 24 September 2009, from <http://www.bloomberg.com/apps/news?pid=20601086&sid=aIaSk8ZyU6RY>
- Schneider, Arthur S., Szanto, Philip A. (2006). *Pathology (3rd Edition)*. Philadelphia: Lippincott Williams & Wilkins.
- Sides Will Talk. (2009). *Honduras News*. Retrieved 5 October 2009, from <http://www.hondurasnews.com/sides-will-talk-decree-will-be-lifted/#more-2693>

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute

Students Forced to March for Zelaya. (2009). *Honduras News*. Retrieved 10 September 2009, from <http://www.hondurasnews.com/students-forced-to-march-for-zelaya/#more-2326>

Stumvoll, M., Goldstein, B.J., Van Haeften, T.W., (2005). Type 2 Diabetes: Principles of Pathogenesis and Therapy. *Lancet*. 365, 1333-1346.

Spain Advises Against Travel. (2009). *Honduras News*. Retrieved 29 June 2009, from <http://www.hondurasnews.com/spain-advises-against-travel/>

Supreme Court of Justice Building Bombed. (2009). *Honduras News*. Retrieved 26 November 2009, from <http://www.hondurasnews.com/supreme-court-of-justice-building-bombed/#more-3342>

Supreme Court Overturns Zelaya. (2009). *Honduras News*. Retrieved 29 June 2009, from <http://www.hondurasnews.com/supreme-court-overturns-zelaya/>

Supreme Court Says Cannot Reinstate Zelaya. (2009). *Honduras News*. Retrieved 20 October 2009, from <http://www.hondurasnews.com/supreme-court-says-cannot-reinstate-zelaya/#more-2885>

Taiwan Still Backs Honduran Government. (2009). *Honduras News*. Retrieved 2 July 2009, from <http://www.hondurasnews.com/taiwan-still-backs-honduran-government/#more-1844>

Taxis on Strike. (2009). *Honduras News*. Retrieved 8 August 2009, from <http://www.hondurasnews.com/taxis-on-strike/#more-2109>

Tegucigalpa Water Shortage Continues. (2009). *Honduras News*. Retrieved 4 December 2009, from <http://www.hondurasnews.com/tegucigalpa-water-shortage-continues/#more-3496>

Tension grips Honduras with ousted leader's surprise return. (2009). *CNN*. Retrieved 24 September 2009, from <http://articles.cnn.com/2009-09->

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute

[23/world/honduras.ousted.president_1_president-roberto-micheletti-brazilian-embassy-curfew?_s=PM:WORLD](http://www.cnn.com/2009/09/24/world/honduras.ousted.president_1_president-roberto-micheletti-brazilian-embassy-curfew?_s=PM:WORLD)

The National Front of Resistance Against Coup Communication No. 33. (2009). *Honduras News*. Retrieved 7 November 2009, from <http://www.hondurasnews.com/the-national-front-of-resistance-against-coup-communication-no-33/#more-3123>

Three Explosives Found Near Prison. (2009). *Honduras News*. Retrieved 5 December 2009, from <http://www.hondurasnews.com/three-explosives-found-near-prison/>

Transportation Strike in Tegucigalpa. (2009). *Honduras News*. Retrieved 15 December 2009, from <http://www.hondurasnews.com/transportation-strike-in-tegucigalpa/#more-3575>

TSE Announces Election Results. (2009). *Honduras News*. Retrieved 30 November 2009, from <http://www.hondurasnews.com/tse-announces-election-results/#more-3434>

TSE Releases Final Election Numbers. (2009). *Honduras News*. Retrieved 22 December 2009, from <http://www.hondurasnews.com/tse-releases-final-election-numbers/#more-3606>

U.N. “doesn’t smell of sulfur anymore,” says Chavez. (2009). *CNN*. Retrieved 24 September 2009, from http://articles.cnn.com/2009-09-24/world/chavez.venezuela.united.nations_1_venezuelan-president-hugo-chavez-smell-president-obama?_s=PM:WORLD

U.S. Department of State. (2009). *Background Note: Honduras*. Retrieved March 2, 2009 from <http://www.state.gov/r/pa/ei/bgn/1922.htm>.

U.S. to Honduras: End emergency decree now. (2009). *CNN*. Retrieved 30 September 2009, from http://articles.cnn.com/2009-09-29/world/honduras.ousted.president_1_roberto-micheletti-emergency-decree-brazilian-embassy?_s=PM:WORLD

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute

U.S. “hits the pause button” on aid to Honduras. (2009). *CNN*. Retrieved 3 July 2009, from <http://www.cnn.com/2009/POLITICS/07/02/honduras.aid/index.html?iref=allsearch>

UN condemns Honduras “harassment”. (2009). *BBC News*. Retrieved 26 September 2009, from <http://news.bbc.co.uk/2/hi/americas/8275988.stm>

United States Stops Aid. (2009). *Honduras News*. Retrieved 10 July 2009, from <http://www.hondurasnews.com/united-states-stops-aid/#more-1922>

US Embassy Public Announcement. (2009). *Honduras News*. Retrieved 29 June 2009, from <http://www.hondurasnews.com/us-embassy-public-announcement/>

US Halts MCC Funds for Honduras. (2009). *Honduras News*. Retrieved 10 September 2009, from <http://www.hondurasnews.com/us-halts-mcc-funds-for-honduras/#more-2347>

US Military Confirms Zelaya’s Presence. (2009). *Honduras News*. Retrieved 22 September 2009, from <http://www.hondurasnews.com/us-military-confirms-zelayas-presence/#more-2484>

USAID Adds to Pressure. (2009). *Honduras News*. Retrieved 28 August 2009, from <http://www.hondurasnews.com/usaaid-adds-to-pressure/#more-2236>

Use of mercenaries in Honduras on the rise, U.N. panel says. (2009). *CNN*. Retrieved 11 October 2009, from http://articles.cnn.com/2009-10-09/world/honduras.mercenaries_1_honduran-supreme-court-government-of-roberto-micheletti-amnesty-international?_s=PM:WORLD

Velasquez Wants Peace. (2009). *Honduras News*. Retrieved 29 June 2009, from <http://www.hondurasnews.com/velasquez-wants-peace/>

Venezuela Suspends Shipments. (2009). *Honduras News*. Retrieved 9 July 2009, from <http://www.hondurasnews.com/venezuela-suspends-shipments/#more-1915>

- Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute
- Venezuelan Diplomats Expelled. (2009). *Honduras News*. Retrieved 23 July 2009, from <http://www.hondurasnews.com/venezuelan-diplomats-expelled/#more-2006>
- Wang, Youfa, Rimm, Eric B., Stampfer, Meir J., Willett, Walter C., Hu, Frank B., (2005). Comparison of abdominal adiposity and overall obesity in predicting risk of type 2 diabetes among men. *Am J Clin Nutr*, 81, 555-563.
- Water Rationing in Tegucigalpa. (2009). *Honduras News*. Retrieved 14 November 2009, from <http://www.hondurasnews.com/water-rationing-in-tegucigalpa/>
- World Bank in Support of Aid to Honduras. (2009). *Honduras News*. Retrieved 18 September 2009, from <http://www.hondurasnews.com/world-bank-in-support-of-aid-to-honduras/#more-2430>
- World Bank Strong-Arms Honduras. (2009) *Honduras News*. Retrieved 1 July 2009, from <http://www.hondurasnews.com/world-bank-strong-arms-honduras/>
- Williamson, Kathleen B. (2007). Stretching Exercises. *Women's Heart Foundation*. Retrieved April 26, 2009, from http://www.womensheart.org/content/Exercise/stretching_exercise.asp
- World Health Organization [WHO]. (2011). Diabetes Fact Sheet. *Media Centre*. Retrieved June 7, 2011, from <http://www.who.int/mediacentre/factsheets/fs312/en/>
- World Health Organization [WHO]. (2009). Obesity and overweight. *Global Strategy on Diet, Physical Activity and Health*. Retrieved February 20, 2009, from <http://www.who.int/dietphysicalactivity/publications/facts/obesity/en/>.
- World Health Organization [WHO]. (2008). Section 3: Guide to Physical Measurements (Step 2). *WHO STEPS Surveillance*. Retrieved April 25, 2009, from http://www.who.int/chp/steps/Part3_Section3.pdf.

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute

Zelaya Accepts No “Agreement” Returning Him to the Presidency of Honduras. (2009).

Honduras News. Retrieved 16 November 2009, from

<http://www.hondurasnews.com/zelaya-accepts-no-agreement-returning-him-to-the-presidency-of-honduras/#more-3233>

Zelaya at Border Second Day. (2009). *Honduras News*. Retrieved 26 July 2009, from

<http://www.hondurasnews.com/zelaya-at-border-second-day/#more-2034>

Zelaya Attempts to Retrieve Election Materials. (2009). *Honduras News*. Retrieved 29 June

2009, from <http://www.hondurasnews.com/zelaya-attempts-to-retrieve-election-materials/>

Zelaya Backers Warn with Dogs. (2009). *Honduras News*. Retrieved 22 August 2009, from

<http://www.hondurasnews.com/zelaya-backers-warn-with-dogs/#more-2192>

Zelaya Disowns the Socialist Revolutionary Front. (2009). *Honduras News*. Retrieved 23

October 2009, from <http://www.hondurasnews.com/zelaya-disowns-the-socialist-revolutionary-front/#more-2928>

Zelaya Fires Army General. (2009). *Honduras News*. Retrieved 29 June 2009, from

<http://www.hondurasnews.com/zelaya-fires-army-general/>

Zelaya Gives Ultimatum. (2009). *Honduras News*. Retrieved 15 July 2009, from

<http://www.hondurasnews.com/zelaya-gives-ultimatum/#more-1958>

Zelaya in New York. (2009). *Honduras News*. Retrieved 1 July 2009, from

<http://www.hondurasnews.com/zelaya-in-new-york/>

Zelaya Intends to Change the Constitution. (2009). *Honduras News*. Retrieved 20 July 2009,

from <http://www.hondurasnews.com/zelaya-intends-to-change-the-constitution/#more-2000>

Type II Diabetic Control and Prevalence in Tegucigalpa, Honduras: Patients of the James Moody Adams Clinic at the Baxter Institute

Zelaya Protesters Violent Bunch. (2009). *Honduras News*. Retrieved 12 August 2009, from

<http://www.hondurasnews.com/zelaya-protesters-violent-bunch/#more-2128>

Zelaya returns to Honduras. (2009). *CNN*. Retrieved 23 September 2009, from

http://articles.cnn.com/2009-09-21/world/honduras.ousted.president_1_president-zelaya-brazilian-embassy-honduras?_s=PM:WORLD

Zelaya Supporters Being Moved. (2009). *Honduras News*. Retrieved 1 October 2009, from

<http://www.hondurasnews.com/zelaya-supporters-being-moved/>

Zelaya Supporters Looted Supermarkets and More. (2009). *Honduras News*. Retrieved 25

September 2009, from <http://hondurasnews.com/2009/09/24/zelaya-supporters-looted-supermarkets-and-more/>

Zelaya Supporters Paid. (2009). *Honduras News*. Retrieved 28 July 2009, from

<http://www.hondurasnews.com/zelaya-supporters-paid/#more-2051>

Zelaya Supporters Plan 5 Day March. (2009). *Honduras News*. Retrieved 4 August 2009, from

<http://www.hondurasnews.com/zelaya-supporters-plan-5-day-march/#more-2082>

Zelaya Tells OAS Demand Reinstatement by 15th. (2009). *Honduras News*. Retrieved 8 October

2009, from <http://www.hondurasnews.com/zelaya-tells-oas-demand-reinstatement-by-15th/#more-2717>

Zelaya Will Give 72 Hour Deadline. (2009). *Honduras News*. Retrieved 17 July 2009, from

<http://www.hondurasnews.com/zelaya-will-give-72-hour-deadline/#more-1973>

Zelaya Will Not Honor the Accord. (2009). *Honduras News*. Retrieved 7 November 2009, from

<http://www.hondurasnews.com/zelaya-will-not-honor-the-accord/#more-3125>

APPENDIX A

Historical Timeline of Events Occurring During the Period of June 24, 2009 to December 17, 2009

June 2009 Events

❖ June 24th

- *"Central America Be On Guard" – Honduras News*
 - "to defend Honduras' democracy, sounding the alarm with respect to the dictatorship that is already growing roots through numerous factors of the institutional control that its ruler has." (2009)

❖ June 25th

- *"Chavez Backs Mel" – Honduras News (2009)*
- *"Zelaya Fires Army General" –Honduras News (2009)*
- *"Supreme Court Overturns Zelaya" – Honduras News (2009)*
- *"Zelaya Attempts to Retrieve Election Materials" – Honduras News (2009)*
- *"Impeachment Hearings Being Held" – Honduras News (2009)*
- *"Honduras president challenges government over referendum" - CNN*
 - "A political crisis in Honduras escalated Thursday as a defiant President Jose Manuel Zelaya Rosales, followed by hundreds of supporters, led a loud but peaceful protest to a military base in order to personally take possession of thousands of ballots to be used in a contested referendum Sunday." (2009)

❖ June 26th

- *"Mel Loses His Cool" – Honduras News*
 - "in front of a television audience yesterday, as he ranted for 2 hours and digressed into street talk, insulting Congress and others." (2009)
- *"Honduras heads toward crisis over referendum" – Miami Herald*
 - "Many shops and gasoline stations were closed Friday in the capital, Tegucigalpa, after the city's leading business chamber advised its members to stay shut for fear of disturbances." (2009)
 - "The president led thousands of supporters to the country's main airport, where they seized referendum ballots to keep them from being destroyed at court order." (2009)
 - "Honduras' top court, Congress and the attorney general have all said the referendum he is sponsoring is illegal because the constitution says some of its clauses cannot be changed." (2009)
 - Zelaya "warned legislators, 'You have declared war against me. Now face the consequences.'" (2009)
- *"Velasquez Wants Peace" – Honduras News*
 - "The military will always respect the Constitution of the Republic, and maintain public order." (2009)

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- *"US Embassy Public Announcement" – Honduras News*
 - "US Embassy in Tegucigalpa alerts American citizens residing in and traveling to Honduras of the possibility of demonstrations and protests related to a proposed national opinion poll that may be held on Sunday, June 28." (2009)
- *"Spain Advises Against Travel" – Honduras News (2009)*
- *"Catholic Church Speaks Out" – Honduras News*
 - "that it does not approve of the illegal acts promoted by President Zelaya." (2009)
- *"Chavez Will Intervene With Force"- Honduras News*
 - "The President of Venezuela, Hugo Chavez, officially announced his intention to intervene with force, in the political crisis facing Honduras in order to assist the Honduran President" (2009)
- ❖ June 27th
 - *"Honduras president: Nation calm before controversial vote" – CNN (2009)*
- ❖ June 28th
 - *"Power Out in Tegucigalpa" – Honduras News (2009)*
 - *"Order for President's Capture" – Honduras News (2009)*
 - *"Honduran Congress names provisional president" - CNN*
 - "Hours after the sitting president was deposed by a military-led coup, a new president of Honduras was sworn in Sunday." (2009)
 - "Zelaya awoke to the sound of gunfire in his residence and was still in his pajamas when the military forced him to leave the country Sunday morning, he told reporters." (2009)
 - *"Catholic Church Cancels Mass" – Honduras News (2009)*
 - *"Mel Speaks" – Honduras News*
 - "Mel Zelaya held a conference from Costa Rica, saying he was brutally 'kidnapped' this morning." (2009)
 - *"Curfew Imposed in Honduras" – Honduras News (2009)*
- ❖ June 29th
 - *"Police clash with demonstrators in Honduran capital" – CNN (Brice, 2009)*
- ❖ June 30th
 - *"World Bank Strong-Arms Honduras" – Honduras News (2009)*
 - *"Zelaya in New York" – Honduras News*
 - "for his presentation today in front of the UN." (2009)
 - *"General Assembly condemns coup in Honduras" – United Nations (2009)*

<i>July 2009 Events</i>

- ❖ July 1st
 - *"Taiwan Still Backs Honduran Government" - Honduras News (2009)*
 - *"Ousted president vows to return to Honduras" - CNN*
 - "Zelaya's supporter's burn tires Monday near the presidential palace in Tegucigalpa." They were also reported to have been throwing "rocks at authorities, burned tires and set up roadblocks" (Alis, Labott, Penhaul & Starr, 2009)

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- Zelaya facing charges of “violating the constitution, corruption and drug trafficking” (2009)
- “The World Bank said Tuesday it would freeze funds to Honduras until the crisis is resolved” (2009)
- ❖ July 2nd
 - *“U.S. 'hits the pause button' on aid to Honduras” - CNN*
 - The US warned “that Zelaya could become 'an obstacle' to resolving the crisis if he returned too early” (2009)
- ❖ July 4th
 - *“Honduras’ new leaders reject appeal for Zelaya’s return” - CNN*
 - Honduras ready to “defend its sovereignty” (Penhaul, 2009)
 - *“OAS Moves to Suspend Honduras”- Honduras News*
 - “Honduras only the second country to suffer such a fate after Cuba was suspended, in 1962, following the Communist revolution.” (2009)
 - *“Government Removes Zelaya’s Perks” – Honduras News*
 - *“Honduras Withdraws from OAS” – Honduras News*
 - “Honduran officials agreed it would be best to have 6 months of sanctions while elections are held, than to lose their independence.” (2009)
- ❖ July 5th
 - *“Honduran military prevents ousted leader's landing; clash kills 1”- CNN*
 - “Zelaya said he was denied permission to land at Tegucigalpa’s airport Sunday evening after a deadly clash between Zelaya’s supporters and government troops.” (2009)
- ❖ July 7th
 - *“Clinton: Costa Rican to mediate Honduras crisis” – Deseret News*
 - “Secretary of State Hillary Rodham Clinton said Tuesday that Costa Rican President Oscar Arias will serve as international mediator in the Honduran political crisis.” (2009)
- ❖ July 8th
 - *“Venezuela Suspends Shipments”- Honduras News*
 - “suspension of the delivery of 20,000 barrels of petroleum per day to Honduras, until Manuel Zelaya is restored to power.” (2009)
- ❖ July 9th
 - *“Micheletti Returns to Honduras”- Honduras News*
 - “Zelaya would not meet face to face with Micheletti” (2009)
 - *“United States Stops Aid” – Honduras News (2009)*
 - *“Nicaragua Denies Airspace” – Honduras News*
 - “denied Honduras use of their airspace to transport the President of Honduras, Roberto Micheletti to talks with former President Manual Zelaya.” (2009)
- ❖ July 13th
 - *“Pope Speaks of Honduras”- Honduras News*

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- Expresses his hopes for a peaceful resolution (2009)
- ❖ July 14th
 - *“Zelaya Gives Ultimatum” – Honduras News*
 - “Zelaya has stated that if talks with Costa Rica on Saturday do not produce results to his liking, he will return to Honduras at any cost.” (2009)
- ❖ July 16th
 - *“Honduran Cardinal Asks for Unity” – Honduras News (2009)*
 - *“Zelaya Will Give 72 Hour Deadline” – Honduras News*
 - “If there is no resolution, the President Zelaya will take other actions” (2009)
- ❖ July 19th
 - *“Zelaya Intends to Change the Constitution” – Honduras News (2009)*
- ❖ July 20th
 - *“Earthquake in Honduras”- Honduras News (2009)*
- ❖ July 22nd
 - *“Honduras’ Economy Hit Hard”- Honduras News*
 - “In the capital city of Tegucigalpa alone, the economic losses caused by the impact of the political turmoil have reached about 1 billion lempiras (some 52.6 million U.S. dollars), according to Bulnes.” (2009)
 - *“Venezuelan Diplomats Expelled”- Honduras News (2009)*
- ❖ July 25th
 - *“Zelaya at Border Second Day”- Honduras News*
 - “Zelaya made a second trip to the Honduran border today...with Nicaraguan police escorts...said he would keep coming back for the few days until he is allowed to be reunited with his family” (2009)
- ❖ July 26th
 - *“Border Curfew Extended”- Honduras News*
 - “extended the curfew on the border with Nicaragua to 42 hours” (2009)
 - *“Nicaragua May Expel Mel” – Honduras News*
 - “President Daniel Ortega is being accused of wanting to start a civil war in Honduras by providing Zelaya the recent escorts to the Nicaragua/Honduras border” (2009)
- ❖ July 27th
 - *“The Path Forward for Honduras” – Wall Street Journal*
 - The truth for why Zelaya was removed “is that he was removed by a democratically elected civilian government because the independent judicial and legislative branches of our government found that he had violated our laws and constitution.” (Micheletti, 2009)
 - “The constitution expressly states in Article 239 that any president who seeks to amend the constitution and extend his term is automatically disqualified and is no longer president. There is no express provision for an impeachment process in the

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Honduran constitution. But the Supreme Court’s unanimous decision affirmed that Mr. Zelaya was attempting to extend his term with his illegal referendum. Thus, at the time of his arrest he was no longer—as a matter of law, as far as the Supreme Court was concerned—president of Honduras.” (2009)

- *“Zelaya Supporters Paid” – Honduras News*
 - “Activists called the ‘Front Against the Coup d’etat’ received payments of thousands of dollars” (2009)
- ❖ July 31st
 - *“Protests Escalate”- Honduras News*
 - “Police said 25 people were injured and 88 arrested July 30th in clashes between protesters and security forces at several locations around Tegucigalpa.” (2009)

<i>August 2009 Events</i>

- ❖ August 3rd
 - *“Zelaya Supporters Plan 5 Day March”- Honduras News*
 - “Zelaya supporters said they would begin a five-day march in two of Honduras’ main cities, San Pedro Sula and Tegucigalpa, starting Wednesday.” (2009)
- ❖ August 4th
 - *“Protests Hurt Honduras”- Honduras News*
 - “demonstrations for former President Manuel Zelaya are weakening the economy, and ensured that striking public employees won’t be paid.” (2009)
- ❖ August 6th
 - *“Earthquakes in Honduras” – Honduras News (2009)*
 - *“Protest Clampdown”- Honduras News*
 - “Honduran police clashed with supporters of ousted leader Manuel Zelaya in the country’s capital, Tegucigalpa yesterday.” (2009)
- ❖ August 7th
 - *“Health Workers Join Strike” – Honduras News*
 - “Approximately 8,000 health workers went on strike, affecting 28 hospitals and more than 1,000 health centers across Honduras.” (2009)
 - *“OAS Delegation Announced” – Honduras News (2009)*
 - *“Taxis on Strike” – Honduras News (2009)*
- ❖ August 11th
 - *“Honduras Flu Cases Increase”- Honduras News (2009)*
 - *“Zelaya Protesters Violent Bunch”- Honduras News*
 - “A demonstration in support of ousted Honduran President Manuel Zelaya turned violent when a group of protesters set fire to a fast-food restaurant in Tegucigalpa today.” (2009)

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- ❖ August 12th
 - *“Curfew in Tegucigalpa”- Honduras News (2009)*
 - *“Destructive Protests Continue”- Honduras News*
 - “Thousands of protesters...clashed with police Wednesday for the second day in a row” (2009)
- ❖ August 13th
 - *“Protesters Attack VP of Congress” – Honduras News*
 - “Police quickly rescued Ramon Velazquez, the vice-president of congress, after he was attacked leaving his office on Wednesday.” (2009)
- ❖ August 14th
 - *“Ambassador Problem for Argentina” – Honduras News*
 - “The Argentine government Thursday demanded that the Honduran ambassador to Argentina stop publicly supporting the current Honduran administration led by Roberto Micheletti, and thereafter ordered the expulsion of the Honduran ambassador.” (2009)
- ❖ August 15th
 - *“El Heraldo Victim of Attack”- Honduras News*
 - “The attack early Saturday was the sixth against media outlets and other institutions critical of Zelaya.” (2009)
 - *“La Tribuna Victim of Attack”- Honduras News*
 - “A delivery vehicle from the Honduran daily La Tribuna was set on fire Friday morning” (2009)
- ❖ August 18th
 - *“Argentine Diplomats Must Leave Honduras” – Honduras News*
 - “Honduras’ government ordered Argentine diplomats Tuesday to leave the country in three days. The Foreign Ministry said the diplomats were ordered to leave in response to Argentina’s decision to expel the Honduran ambassador. Venezuela’s envoys have also been told to leave but have refused, saying they will not recognize an order by a coup-installed government.” (2009)
- ❖ August 19th
 - *“Amnesty Int’l Claims Abuse in Honduras” – Honduras News (2009) & Amnesty International (2009)*
- ❖ August 21st
 - *“Zelaya Backers Warn with Dogs”- Honduras News (2009)*
- ❖ August 22nd
 - *“Ambassadors Being Expelled” – Honduras News*
 - “Argentine diplomats are staying put in Tegucigalpa, ignoring a Friday deadline from the country’s government to leave Honduras.” (2009)
- ❖ August 24th
 - *“OAS in Honduras for One Week” – Honduras News (2009)*

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- *“OAS Still Wants Zelaya Back”- Honduras News*
 - “Approximately 2,000 Zelaya supporters marched through the capital today despite heavy security measures in place for OAS members.” (2009)
- ❖ August 27th
 - *“USAID Adds to Pressure”- Honduras News (2009)*

<i>September 2009 Events</i>

- ❖ September 2nd
 - *“Bomb Thrown in Tegucigalpa”- Honduras News (2009)*
- ❖ September 9th
 - *“Students Forced to March for Zelaya” – Honduras News*
 - “Instead of being in the classroom to receive “the bread of knowledge”, dozens of schoolchildren were forced into the streets Monday and Tuesday to join the march for the “resistance” held in the capital.” (2009)
 - *“US Halts MCC Funds for Honduras”- Honduras News*
 - “The United States today cut off another \$11 million in aid that was under review to be given to Honduras.” (2009)
- ❖ September 10th
 - *“Protestors Take Over School” – Honduras News*
 - “Members of the Worker’s Union of the National Autonomous University of Honduras [Universidad Nacional Autónoma de Honduras] (Sitraunah) took over the facilities of UNAH very early this morning in support of former President Manuel Zelaya.” (2009)
- ❖ September 14th
 - *“Arias Meets Wednesday With Presidential Hopefuls”- Honduras News (2009)*
- ❖ September 17th
 - *“World Bank in Support of Aid to Honduras” – Honduras News*
 - “The World Bank (WB) has urged the G20 to take action to help countries like Honduras” (2009)
- ❖ September 21st
 - *“Curfew in Effect All Day Tuesday” – Honduras News*
 - “extended the curfew across the country from 7:00am to 6:00pm on Tuesday.” (2009)
 - *“US Military Confirms Zelaya’s Presence”- Honduras News*
 - U.S. “called on opposing parties to remain calm and prevent violent incidents.” (2009)
- ❖ September 22nd
 - *“Curfew Extended”- Honduras News*

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- “extends the curfew until 6 a.m. Wednesday.” (2009)
- “*Curfew Extended – 6pm Wednesday*” – *Honduras News* (2009)
- “*Protesters in Tegucigalpa Ignore Curfew*”- *Honduras News*
 - “Fires burned in the streets, numerous cars suffered smashed windows, were stripped, and had deep dents from being beaten, tires were slashed.” (2009)
- “*Zelaya returns to Honduras*”- *CNN*
 - “Zelaya said he spent Sunday night in Guatemala, and that his trip to Tegucigalpa took more than 15 hours. ‘There was a lot of security and roadblocks,’ he said. ‘There is a lot of persecution, a lot of fear in our country.’” (2009)
- ❖ September 23rd
 - “*Honduras Curfew Costs Economy \$50 Million Daily, Canahuati Says*”- *Bloomberg* (*Schmidt & Martinez, 2009*)
 - “*Tension grips Honduras with ousted leader’s surprise return*”- *CNN* (2009)
 - “*Carter urges resolution to Honduran crisis*” – *CNN* (2009)
 - “*U.N. ‘doesn’t smell of sulfur anymore,’ says Chavez*”- *CNN* (2009)
- ❖ September 24th
 - “*Curfew Suspended Until Further Notice*”- *Honduras News* (2009)
 - “*Zelaya Supporters Looted Supermarkets and More*”- *Honduras News*
 - “The total cost of the damage is estimated to be several million lempiras due to the large number of items which were stolen from each of the establishments.” (2009)
- ❖ September 25th
 - “*New Curfews*”- *Honduras News*
 - “The government decreed a curfew Friday in the country, from 8 pm Friday to 5 am Saturday” (2009)
 - “*UN condemns Honduras ‘harassment’*” – *BBC News*
 - “The UN Security Council has called on the interim government of Honduras to ‘cease harassing’ the Brazilian embassy housing deposed leader Manuel Zelaya.” (2009)
- ❖ September 26th
 - “*More Zelaya Protests*”- *Honduras News*
 - “Supporters of Manuel Zelaya have planned a mass protest in Tegucigalpa” (2009)
 - “*New Curfew*”- *Honduras News*
 - “Due to an insurrection called by the former president of Honduras, Manuel Zelaya, the Government of Honduras declared a curfew from 6 pm today until 6 am Sunday.” (2009)
- ❖ September 27th
 - “*Honduras’ leaders push back after Brazilian Embassy snub*” – *CNN* (2009)
 - “*Curfew In Place Again This Evening*”- *Honduras News*

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- “The government declared a curfew from 9:00 pm on Sunday until 5:00 am on Monday” (2009)
- ❖ September 28th
 - “*Honduras revisits emergency decree as frustrations mount*” - CNN
 - “Roberto Micheletti, the de facto president of Honduras, announced Monday that he would lift an emergency decree that allows authorities to limit constitutional rights such as freedoms of expression, travel and gathering in public. But repeal of the law would not be immediate, pending a legal review, he said.” (2009)
- ❖ September 29th
 - “*Curfew Tonight – 10pm to 5am*” – *Honduras News* (2009)
 - “*U.S. to Honduras: End emergency decree now*” - CNN
 - “The U.S. State Department is calling on Honduras' de facto president to immediately rescind an emergency decree that limits constitutional rights such as freedoms of expression, travel and public congregation.” (2009)
- ❖ September 30th
 - “*Zelaya Supporters Being Moved*” – *Honduras News*
 - “Police surrounded the National Agrarian Institute in the capital of Tegucigalpa Wednesday and removed about 55 Zelaya supporters.” (2009)

October 2009 Events

- ❖ October 4th
 - “*Sides Will Talk*” - *Honduras News* (2009)
- ❖ October 5th
 - “*Emergency Decree Repealed*” - *Honduras News*
 - “President Roberto Micheletti and the Council of Ministers repealed the executive decree suspending constitutional guarantees to the population and authorizing the closure of the media inciting insurrection.” (2009)
- ❖ October 6th
 - “*OAS Mission to Arrive Wednesday*” - *Honduras News* (2009)
- ❖ October 7th
 - “*Zelaya Tells OAS Demand Reinstatement by 15th*” - *Honduras News* (2009)
- ❖ October 9th
 - “*60% Advancement in Talks*” - *Honduras News* (2009)
- ❖ October 10th
 - “*Earthquake in Honduras*” - *Honduras News* (2009)
 - “*OAS Asks for Zelaya to be Moved*” – *Honduras News* (2009)
 - “*Plug Will Be Pulled if Stations Incite National Hate*” – *Honduras News*

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- “The decree declared by the government states that, ‘the frequencies of radio or television stations may be canceled if they transmit messages that incite national hate and the destruction of public property.’” (2009)
- “*Use of mercenaries in Honduras on the rise, U.N. panel says*” – CNN (2009)
- ❖ October 16th
 - “*Ousted Honduran leader sets Monday deadline on counteroffer*” – CNN (2009)
- ❖ October 17th
 - “*ALBA Delivers More Sanctions for Honduras*” – Honduras News (2009)
- ❖ October 18th
 - “*Earthquake Hits Honduras – 5.3*” – Honduras News (2009)
- ❖ October 19th
 - “*Micheletti’s New Proposal*” – Honduras News
 - “suggested the final decision, on the reinstatement of Manual Zelaya to the Presidency of the Republic, be held until reports are received from both Congress and the Supreme Court of Justice, who will thoroughly examine the issue Constitutionally.” (2009)
 - “*Supreme Court Says Cannot Reinstate Zelaya*”- Honduras News (2009)
- ❖ October 21st
 - “*Printing of Election Ballots Begins in Honduras*”- Honduras News (2009)
 - “*Earthquakes Felt in Honduras*” – Honduras News (2009)
- ❖ October 22nd
 - “*Resistance Demonstrations Continue*”- Honduras News (2009)
 - “*Zelaya Disowns the Socialist Revolutionary Front*” – Honduras News (2009)
- ❖ October 26th
 - “*Micheletti’s Nephew Assassinated*” – Honduras News (2009)
 - “*Military Colonel Assassinated in Tegucigalpa*” – Honduras News (2009)
- ❖ October 27th
 - “*Deputy Defense Minister’s Dad Kidnapped*” – Honduras News (2009)
- ❖ October 30th
 - “*Deal struck to end Honduran leadership standoff*”- CNN
 - “an agreement to form a government of national reconciliation that could reinstate Zelaya.” (2009)

<i>November 2009 Events</i>

- ❖ November 5th
 - “*Radio HRN Attacked Last Night*”- Honduras News
 - “Radio HRN’s building was compromised yesterday evening, with the explosion of a grenade inside.” (2009)

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- ❖ November 6th
 - *“FINNALLY! US Travel Alert Honduras Revised!”- Honduras News*
 - “The Department of State...recommends that American citizens exercise caution when traveling to Honduras, while deferring all non-essential travel to the capital city of Tegucigalpa until further notice.” (2009)
 - *“Interim leader announces unity government for Honduras”- CNN (2009)*
 - *“The National Front of Resistance Against Coup Communication No. 33” – Honduras News*
 - “We warn all organizations of the national resistance to that in the case of not giving the return of President Zelaya on time are ready to implement the actions of ignorance of the electoral farce.” (2009)
 - *“Zelaya Will Not Honor the Accord”- Honduras News (2009)*
- ❖ November 8th
 - *“Attorney General Attacked Saturday Night”- Honduras News*
 - “It was Attorney General Rubi who ultimately filed the criminal charges on the former president, Manuel Zelaya.” (2009)
- ❖ November 9th
 - *“CSJ Will Not Issue Opinion on Zelaya”- Honduras News (2009)*
- ❖ November 13th
 - *“Grenade Intended for Ballot Boxes Off Target”- Honduras News (2009)*
 - *“Mejia Wants to Turn Himself In”- Honduras News*
 - “The former official of the government of Manuel Zelaya wants to appear voluntarily before the court to answer to criminal charges and be brought before the Anti-Corruption Prosecution.” (2009)
 - *“Water Rationing in Tegucigalpa”- Honduras News*
 - “The severe shortage of water in Tegucigalpa’s homes is expected to last until May 2010” (2009)
- ❖ November 15th
 - *“Grenade at Substation of Enee”- Honduras News*
 - “Another grenade exploded in the capital of Honduras last night.” (2009)
 - *“Ousted Honduran president rejects upcoming election”- CNN*
 - “Zelaya’s rejection of the vote scheduled for November 29 is the latest obstacle to a resolution to the June 28 coup that pushed him out of power. It also puts into question the strength of a breakthrough agreement signed between him and de facto Honduran President Roberto Micheletti last month.” (2009)
 - *“Zelaya Accepts No “Agreement” Returning Him to the Presidency of Honduras”- Honduras News*
 - “In his letter to Obama, Zelaya basically says the Tegucigalpa-San Jose’ Agreement was invalidated...Zelaya now believes he is not willing nor obliged to meet any of the remaining 12 points, including in the electoral process.” (2009)

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- ❖ November 18th
 - *“Brazil and Argentina Won’t Support Elections”- Honduras News (2009)*
 - *“Craig Kelly Leaves Honduras”- Honduras News*
 - “The U.S. envoy to Honduras, Craig Kelly, reiterated today support for the elections of November 29th as part of the solution ‘to the crisis in Honduras’.” (2009)
- ❖ November 19th
 - *“President Roberto Micheletti Addresses Honduras”- Honduras News*
 - “President Roberto Micheletti addressed Hondurans on the local Honduras TV...he will step down from November 25th through December 2nd to help foreign governments lend legitimacy to the elections in Honduras on November 29, 2009.” (2009)
- ❖ November 23rd
 - *“Gas Price Increase”- Honduras News*
 - “For the sixth consecutive week, the government has implemented an increased cost for petroleum products” (2009)
- ❖ November 25th
 - *“MP Says No to Zelaya Reinstatement”- Honduras News*
 - “The Public Ministry (Ministerio Publico – MP)...has determined that the return of the former president is not appropriate, as he is not present in court to answer the 18 charges against him.” (2009)
 - *“Police Crackdown on Terrorists”- Honduras News (2009)*
 - *“Supreme Court of Justice Building Bombed”- Honduras News (2009)*
- ❖ November 26th
 - *“14 of 15 Judges Said NO”- Honduras News*
 - “The Supreme Court has given their analysis to the Secretariat of the National Congress, on the return of former President Manuel Zelaya.” (2009)
 - *“Grenade Goes Off in La Ceiba”- Honduras News*
 - “An explosive device was detonated a few minutes ago inside an intercity bus” (2009)
- ❖ November 28th
 - *“Bomb Lab Found”- Honduras News (2009)*
 - *“Honduras Files with International Court of Justice”- Honduras News*
 - “Honduras’ Foreign Ministry is filing a complaint to the International Court of Justice in The Hague ‘over Brazil’s interference in the country’s internal affairs.’” (2009)
- ❖ November 29th
 - *“Central Americans Observe Happiness”- Honduras News*
 - “The large presence of voters at the polls is an example that Honduras has a very democracy, according to Mexican election observer, James Dominguez.” (2009)

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- *“Hondurans Enthusiastic Today”- Honduras News (2009)*
- *“Israel Recognizes Honduras Elections”- Honduras News*
 - “Israel became the fifth country to officially announce that it would recognize the results of Sunday’s elections in Honduras.” (2009)
- *“TSE Announces Election Results” – Honduras News*
 - “Porfirio ‘Pepe’ Lobo has emerged as the new President of the Republic to govern the Country of Honduras during the years 2010-2014.” (2009)

<i>December 2009 Events</i>

- ❖ December 2nd
 - *“Congress Final Vote – 111 to 14”- Honduras News*
 - “Results: 111 in favor of not restoring Zelaya, 14 in favor” (2009)
- ❖ December 3rd
 - *“Resistance Abandons Zelaya”- Honduras News*
 - “The resistance leader, Juan Barahona, said they will fight from now forward for the installation of a National Constituent Assembly, and have abandoned the fight to have former president Manuel Zelaya returned to office.” (2009)
 - *“Tegucigalpa Water Shortage Continues”- Honduras News (2009)*
- ❖ December 4th
 - *“Three Explosives Found Near Prison”- Honduras News (2009)*
- ❖ December 10th
 - *“Micheletti Applauds the Honduran Military” – Honduras News*
 - “Interim President Roberto Micheletti said during his speech at the promotion ceremony of the Armed Forces, that Honduras is a sovereign country that deserves the respect of the international community, and praised the work of the Honduran army in defense of democracy.” (2009)
- ❖ December 14th
 - *“Transportation Strike in Tegucigalpa”- Honduras News*
 - “More than 1,800 transportation workers created havoc in Tegucigalpa today. In the main stations, hundreds people were waiting to be transported to work and many had to walk to do so.” (2009)
- ❖ December 21st
 - *“TSE Releases Final Election Numbers”- Honduras News*
 - “At the presidential level, the National Party (PN) won with 1,213,695 votes (i.e. 56.56%), and Porfirio Lobo Sosa was elected as the new President of Honduras, for a period of four years, starting January 27, 2010.” (2009)

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APPENDIX B

<i>Data Collection Point Attendance Numbers</i>			
	Total Population	n for Group 1	n for Group 2
<i>Initial Phase</i>			
Pre-intervention population	96	63	33
<i>Intervention Stage</i>			
Data collection point 01: June 29 and July 3	17	10	7
Data collection point 02: July 13 and 17	14	8	6
Data collection point 03: July 27 and 31	20	11	9
Data collection point 04: August 10 and 14	21	11	10
Data collection point 05: August 24 and 28	27	16	11
Data collection point 06: September 7 and 11	35	23	12
Data collection point 07: September 21 and 25	17	7	10
Data collection point 08: October 5 and 9	21	12	9
Data collection point 09: October 19 and 23	17	9	8
Data collection point 10: November 2 and 6	25	19	6
Data collection point 11: November 16 and 20	34	27	7
Data collection point 12: November 30 and December 4	31	28	3
Data collection point 13: December 14 and 17	48	36	12
<i>Sum of participation over Intervention stages</i>	327	217	110
<i>Average of participation over Intervention stages</i>	25.15	16.69	8.46

APPENDIX C

Signs and Symptoms of Type II Diabetes Mellitus (Mayo Clinic Staff & Koetke, Doyle &

Munden, 2009, 2005, 2006):

- Polyuria and Polydisia
- Headaches
- Fatigue
- Lethargy
- Reduced energy levels
- Impaired school and work performance
- Muscle cramps, irritability, and emotional lability
- Vision changes such as blurriness
- Numbness and tingling
- Abdominal discomfort and pain
- Nausea, diarrhea, or constipation
- Slow-healing sores or frequent infections

APPENDIX D

American Diabetes Association: Criteria for testing for pre-diabetes and diabetes in asymptomatic adult individuals

1. Testing should be considered in all adults who are overweight (BMI ≥ 25 kg/m² – although at-risk BMI may be lower in some ethnic groups) and have additional risk factors:
 - a. Physical inactivity.
 - b. First-degree relative with diabetes.
 - c. Member of a high-risk ethnic population (e.g., African American, Latino, Native American, Asian American, and Pacific Islander).
 - d. Women who delivered a baby weighing >9 lb or were diagnosed with Gestational Diabetes mellitus.
 - e. Hypertension ($\geq 140/90$ mmHg or on therapy for hypertension).
 - f. HDL cholesterol level < 35 mg/dl (0.90 mmol/l) and/or a triglyceride level > 250 mg/dl (2.82 mmol/l).
 - g. Women with polycystic ovarian syndrome (PCOS).
 - h. Impaired Glucose Tolerance (IGT) or Impaired Fasting Glucose (IFG) on previous testing.
 - i. Other clinical conditions associated with insulin resistance (e.g., severe obesity and acanthosis nigricans).
 - j. History of Cardiovascular Disease.
2. In the absence of the above criteria, testing for pre-diabetes and diabetes should begin at age 45 years.

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3. If results are normal, testing should be repeated at least at 3-year intervals, with consideration of more frequent testing depending on initial results and risk status.

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APPENDIX E

Daily Exercise Regimen				
Month	Day of the week	Warm-up	Exercise	Cool-Down
June 29 - July 3	Monday	Stretching Arm Circles Squats Wall Pushes	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Squats Arm Circles
	Tuesday	Stretching Arm Circles Wall Pushes Standing Alternate Knee-Lift Crunches	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Wall Pushes Arm Circles
	Wednesday	Stretching Arm Circles Wall Pushes Lunges	Step Aerobics	Wall Pushes Arm Circles
	Thursday	Stretching Arm Circles Side Leg Raises Standing Alternate Knee-Lift Crunches	Step Aerobics	Side Leg Raises Arm Circles
	Friday	Stretching Arm Circles Wall Pushes Squats	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Squats Arm Circles
July 6 - 31	Monday	Stretching Arm Circles Squats Wall Pushes	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Wall Pushes Arm Circles
	Tuesday	Stretching Arm Circles Wall Pushes Standing Alternate Knee-Lift Crunches	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Wall Pushes Arm Circles
	Wednesday	Stretching Arm Circles Wall Pushes Lunges	Step Aerobics	Wall Pushes Arm Circles
	Thursday	Stretching Arm Circles Side Leg Raises Squats	Step Aerobics with Twisting Knee-Lifts	Side Leg Raises Arm Circles
	Friday	Stretching Arm Circles Squats Jumping Jacks	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Jumping Jacks Arm Circles

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<i>Daily Exercise Regimen</i>				
<i>Month</i>	<i>Day of the week</i>	<i>Warm-up</i>	<i>Exercise</i>	<i>Cool-Down</i>
August 3 - 28	Monday	Stretching Arm Circles Squats Wall Pushes	Step Aerobics	Wall Pushes Arm Circles
	Tuesday	Stretching Arm Circles Wall Pushes Standing Alternate Knee-Lift Crunches	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Wall Pushes Arm Circles
	Wednesday	Stretching Arm Circles Wall Pushes Jumping Jacks	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Jumping Jacks Arm Circles
	Thursday	Stretching Arm Circles Side Leg Raises Squats	Step Aerobics with Twisting Knee-Lifts	Side Leg Raises Arm Circles
	Friday	Stretching Arm Circles Squats Jumping Jacks	Step Aerobics with Twisting Knee-Lifts	Jumping Jacks Arm Circles
Aug. 31 - Sept. 25	Monday	Stretching Arm Circles Squats Wall Pushes	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Wall Pushes Arm Circles
	Tuesday	Stretching Arm Circles Wall Pushes Standing Alternate Knee-Lift Crunches	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Wall Pushes Arm Circles
	Wednesday	Stretching Arm Circles Side Leg Raises Jumping Jacks	Step Aerobics with Twisting Knee-Lifts	Jumping Jacks Arm Circles
	Thursday	Stretching Arm Circles Side Leg Raises Squats	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Side Leg Raises Arm Circles
	Friday	Stretching Arm Circles Squats Jumping Jacks	Step Aerobics with Twisting Knee-Lifts	Jumping Jacks Arm Circles

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<i>Daily Exercise Regimen</i>				
<i>Month</i>	<i>Day of the week</i>	<i>Warm-up</i>	<i>Exercise</i>	<i>Cool-Down</i>
Sept. 28 - Oct. 30	Monday	Stretching Arm Circles Side Leg Raises Wall Pushes	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Wall Pushes Arm Circles
	Tuesday	Stretching Arm Circles Wall Pushes Standing Alternate Knee-Lift Crunches	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Wall Pushes Arm Circles
	Wednesday	Stretching Arm Circles Squats Jumping Jacks	Step Aerobics with Twisting Knee-Lifts	Jumping Jacks Arm Circles
	Thursday	Stretching Arm Circles Jumping Jacks Wall Pushes	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Jumping Jacks Arm Circles
	Friday	Stretching Arm Circles Squats Jumping Jacks	Step Aerobics with Twisting Knee-Lifts	Side Leg Raises Arm Circles
November 2 - 27	Monday	Stretching Arm Circles Squats Wall Pushes	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Wall Pushes Arm Circles
	Tuesday	Stretching Arm Circles Wall Pushes Standing Alternate Knee-Lift Crunches	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Wall Pushes Arm Circles
	Wednesday	Stretching Arm Circles Side Leg Raises Jumping Jacks	Step Aerobics with Twisting Knee-Lifts	Jumping Jacks Arm Circles
	Thursday	Stretching Arm Circles Side Leg Raises Squats	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Side Leg Raises Arm Circles
	Friday	Stretching Arm Circles Squats Jumping Jacks	Step Aerobics with Twisting Knee-Lifts	Jumping Jacks Arm Circles

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<i>Daily Exercise Regimen</i>				
<i>Month</i>	<i>Day of the week</i>	<i>Warm-up</i>	<i>Exercise</i>	<i>Cool-Down</i>
Nov. 30 - Dec. 17	Monday	Stretching Arm Circles Side Leg Raises Wall Pushes	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Wall Pushes Arm Circles
	Tuesday	Stretching Arm Circles Wall Pushes Standing Alternate Knee-Lift Crunches	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Wall Pushes Arm Circles
	Wednesday	Stretching Arm Circles Squats Jumping Jacks	Step Aerobics with Twisting Knee-Lifts	Jumping Jacks Arm Circles
	Thursday	Stretching Arm Circles Jumping Jacks Wall Pushes	Walking or Jogging (dependent on participants level of health and fitness) in place for 15 minutes.	Jumping Jacks Arm Circles
	Friday	Stretching Arm Circles Squats Jumping Jacks	Step Aerobics with Twisting Knee-Lifts	Side Leg Raises Arm Circles

Exercises were broken down as follows:

Warm-up Exercises

- 1) Stretches (Williamson, 2007): 4 minutes.
 - a. Stretches for side of neck. Rotational stretch, illustrated in Figure 13:
 - i. Stand with arms hanging loosely at sides.
 - ii. Turn head to one side, then to the other side
 - iii. Hold for 5 seconds, each side
 - iv. Repeat, for total of 2 times each direction (for total time of 20 seconds)
 - b. Stretches for side of neck. Side bending stretch, illustrated in Figure 14:
 - i. Stand with arms hanging loosely at sides.

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- ii. Tilt head sideways to one side, then to the other
 - iii. Hold for 5 seconds, each side.
 - iv. Repeat, for total of 2 times each direction (for total time of 20 seconds)
- c. Stretches for back of neck, illustrated in Figure 15:
- i. Stand with arms hanging loosely at sides.
 - ii. Gently tilt head forward to stretch back of neck.
 - iii. Hold for 5 seconds.
 - iv. Repeat, for total of 2 times (total time of 10 seconds)
- d. Stretches for side of shoulder and back of upper arm, illustrated in Figure 16:
- i. Stand and place right hand on left shoulder
 - ii. With left hand, pull right elbow across chest toward left shoulder and hold for 10 seconds.
 - iii. Repeat on other side. (total time of 20 seconds)
- e. Stretches for shoulder, middle back, arms, hands, fingers, and wrist. Illustrated in Figure 17:
- i. Interlace fingers and turn palms out.
 - ii. Extend arms in front at shoulder height.
 - iii. Hold 10 seconds, relax, and repeat (for total time of 20 seconds)

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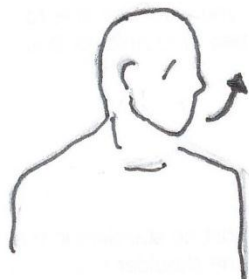


Figure 13: Illustration of Rotational Neck Stretch



Figure 14: Illustration of Side Bending Neck Stretch

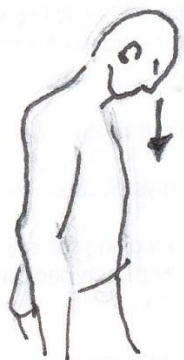


Figure 15: Illustration of Back of Neck Stretch

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Figure 16: Illustration of Side of Shoulder and Back of Upper Arm Stretch

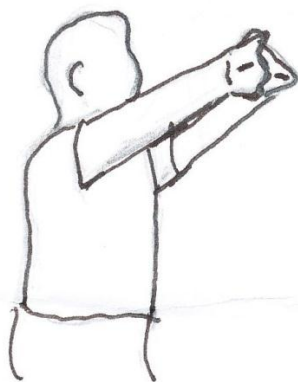


Figure 17: Illustration of Shoulder, Middle Back, Arms, Hands, Fingers, and Wrist Stretch

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- f. Stretches for triceps, top of shoulders, and waist. Illustrated in Figure 18:
 - i. Keep knees slightly flexed.
 - ii. Stand with arms overhead.
 - iii. Hold elbow with hand of opposite arm.
 - iv. Pull elbow behind head gently as you slowly lean to side until mild stretch is felt.
 - v. Hold for 15 seconds.
 - vi. Repeat on other side (total time 30 seconds).
- g. Stretches middle back. Illustrated in Figure 19:
 - i. Stand with hands on hips, and keep knees slightly flexed.
 - ii. Gently twist torso at waist until stretch is felt.
 - iii. Hold for 15 seconds.
 - iv. Repeat on other side (total time of 30 seconds)
- h. Stretches for calves. Illustrated in Figure 20:
 - i. Stand a little way from a wall and lean on it with forearms, head resting on hands.
 - ii. Place right foot in front of you, leg bent, left leg straight behind you.
 - iii. Slowly move hips forward until you feel stretching in calf of left leg.
 - iv. Keep left heel flat and toes pointed straight ahead.
 - v. Hold easy stretch for 15 seconds.
 - vi. Do not bounce; and do not hold breath.
 - vii. Repeat on other side (total time 30 seconds).

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Figure 18: Illustration of Triceps, Top of Shoulders, and Waist Stretch



Figure 19: Illustration of Middle Back Stretch

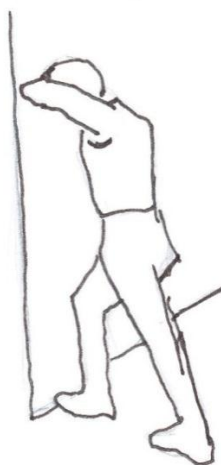


Figure 20: Illustration of Calf Stretch

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- i. Stretches for front of thigh (quadriceps). Illustrated in Figure 21:
 - i. Stand a little way from a wall and place left hand on wall for support.
 - ii. Standing straight, grasp top of left foot with right hand.
 - iii. Pull heel toward buttock.
 - iv. Hold for 15 seconds.
 - v. Repeat on other side (total time 30 seconds).
 - j. Stretches for inner thigh and groin. Illustrated in Figure 22:
 - i. Stand with feet pointed straight ahead, a little more than shoulder-width apart.
 - ii. Bend right knee slightly and move left hip downward toward right knee.
 - iii. Hold for 15 seconds (if necessary, hold onto something for balance).
 - iv. Repeat on other side (total time 30 seconds).
- 2) Arm Circles. Illustrated in Figure 23: 2 minutes
- a. Stand with your feet shoulder width apart and raise arms straight out to the sides and shoulder height.
 - b. Slowly start by making small circular motions in a forward direction for 30 seconds.
 - c. Repeat in opposite direction, for 30 seconds.
 - d. Then enlarge the circles and repeat in a forward circular motion for 30 seconds.
 - e. Repeat in opposite direction, for 30 seconds (total time 2 minutes).

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Figure 21: Illustration of Quadriceps Stretch

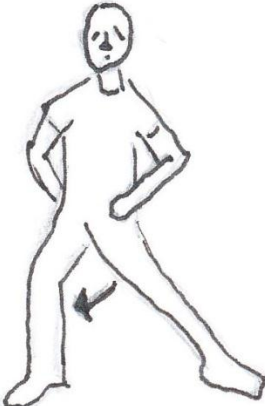


Figure 22: Illustration of Inner Thigh and Groin Stretch

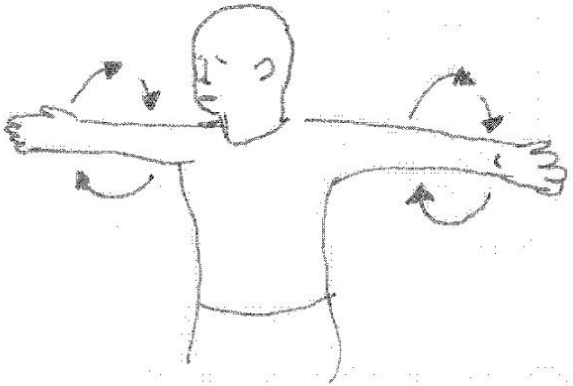


Figure 23: Illustration of Arm Circles

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- 3) Wall Push Ups. Illustrated in Figure 24: 2 minutes
 - a. Stand arm's length away from wall, with feet shoulder width apart.
 - b. Place hands onto wall, slightly wider than shoulder-width apart.
 - c. Keep head in a neutral position, and bend elbows to lower head and chest toward the wall.
 - d. Straighten arms and return to your starting position.
 - e. Repeat for 2 minutes.
 - f. Remember to breath.

- 4) Squats (About.com, 2009). Illustrated in Figure 25: 2 minutes
 - a. Stand with feet about hip or shoulder width apart, with toes at a natural angle pointing forward or slightly out.
 - b. Bring arms out in front of you for balance.
 - c. Bend your knees and squat, pushing your buttocks out as though you're about to sit in a chair.
 - d. Knees should stay behind the toes, and keep knees in same direction as your toes.
 - e. Avoid arching back; keep a neutral back and pelvis.
 - f. Squat as low as you can or until your thighs are parallel to the ground.
 - g. Push yourself back up, while doing so concentrate on squeezing your gluteus as you stand.

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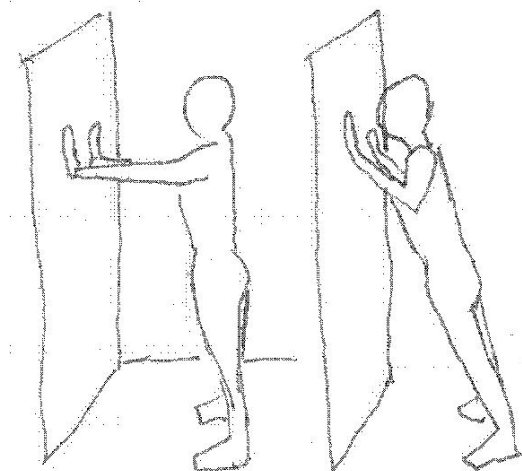


Figure 24: Illustration of Wall Push Ups

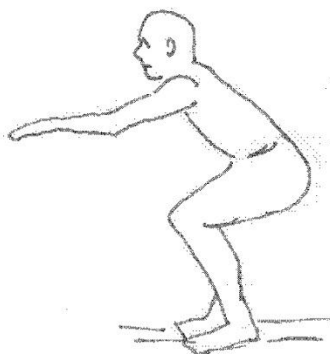


Figure 25: Illustration of Squatting Technique

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- 5) Jumping Jacks. Illustrated in Figure 26: 2 minutes
 - a. Standing with feet together and arms loosely at your side.
 - b. Keep knees slightly bent and jump to a new position in which your legs are spread wider and your hands are touching above your head.
 - c. Jump back to your starting position.
 - d. Repeat this jumping exercise for 2 minutes.

- 6) Side Leg Raises. Illustrated in Figure 27: 2 minutes
 - a. Standing with your feet shoulder width apart and arms loosely at your side. (Feel free to hold onto something to help keep your balance).
 - b. Keep your legs and back straight; avoid arching your back.
 - c. Lift your right leg about 6-12 inches out to the side.
 - d. Hold this position for 4 seconds and return to your starting position and relax for 1 second. Do this 12 times for a total time of 60 seconds.
 - e. Repeat step with opposite leg and do 12 times. Overall time 2 minutes (1 minute per leg).

- 7) Lunges, illustrated in Figure 28: 2 minutes
 - a. Standing with feet shoulder width apart and hands entwined behind your lower back.
 - b. With your right leg take a long step forward, about 3 feet in front of the other.
 - c. Be sure to keep your front knee aligned with your front ankle; and your back heel should be lifted.
 - d. Slowly lower your hips about 8 inches and hold this position for 3 seconds.

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- e. Slowly return to your starting position and relax for 2 seconds, for a total time of 5 seconds per rep.
 - f. Do 12 reps with Right leg and then do 12 reps with Left leg. Overall time 2 minutes (1 minute per leg).
- 8) Standing Alternate Knee-Lift Crunch, illustrated in Figure 29: 2 minutes
- a. Stand with feet shoulder width apart.
 - b. Raise your arms to shoulder height and bring your hands to just behind your head (near your ears).
 - c. Lift your Left foot off the ground and crunch your right shoulder to your left knee.
 - d. Return to your starting position and repeat step with opposite leg and shoulder.
 - e. Repeat alternating knee-lift crunches for 2 minutes

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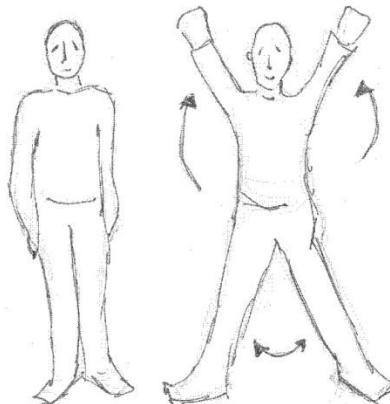


Figure 26: Illustration of Jumping Jacks

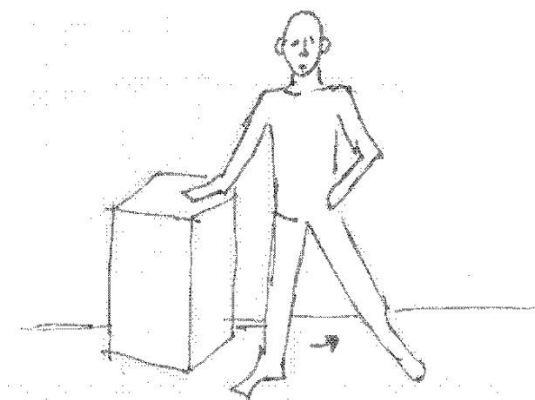


Figure 27: Illustration of Side Leg Raise

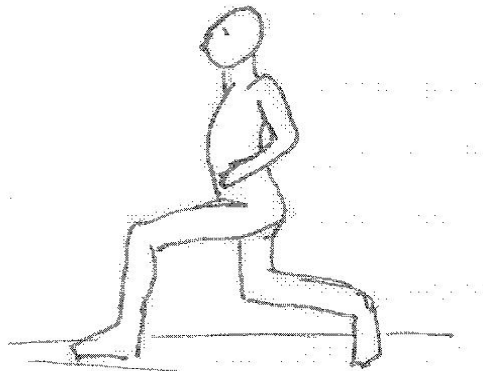


Figure 28: Illustration of Lunge Technique

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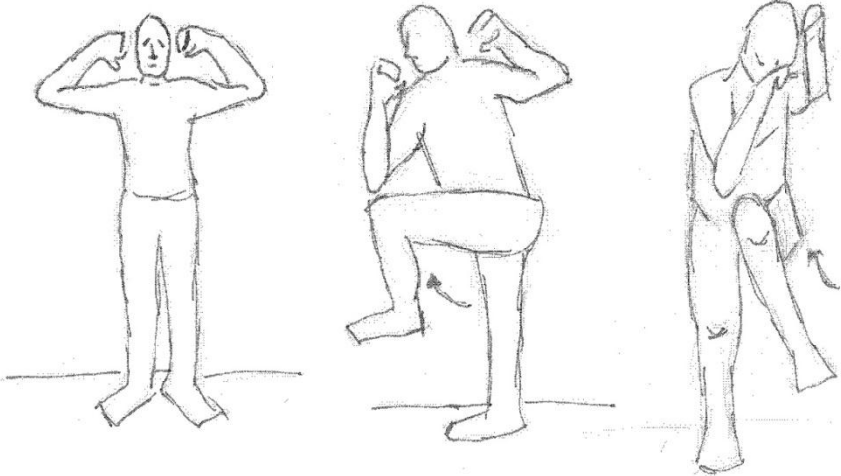


Figure 29: Illustration of Standing Alternate Knee-Lift Crunch

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Exercise portion of this Regimen were made up of one of three exercises. These exercises were conducted over a 15 minute time period.

- 1) Walking or jogging in place for 15 minutes.
 - a. Participants either walked or jogged depending on their health status and physical fitness level.
 - b. Patients were allowed to switch from jogging to walking if needed during the 15 minute workout.

- 2) Basic Step Aerobics:
 - a. Met around the elevated meeting area by the Nutrition Office.
 - b. Patients stood around the elevated level and then stepped up onto the elevated floor with their Right foot.
 - c. Steps went as follows:
 - i. Step up with right foot, followed by the left foot; now standing on the elevated floor.
 - ii. Step back down with left foot, followed by the right; and now standing on the main floor.
 - iii. Repeat for 15 minutes

- 3) Basic Step Aerobic with Twisting Knee-Lift:
 - a. Met around the elevated meeting area by the Nutrition Office.
 - b. Patients stood around the elevated level and then stepped up onto the elevated floor with their Right foot.
 - c. Steps were as follows:

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- i. Step up with right foot, and lifting the left knee up until left thigh is parallel with the floor.
- ii. Bring the left foot back down to the starting position, and step down with the right foot returning both feet to the starting position.
- iii. Step up with the left foot, and lift the right knee up until right thigh is parallel with the floor.
- iv. Bring the right foot back down to the starting position, and step down with the left foot returning both feet to the starting position.
- v. Repeat for 15 minutes.

Cool downs consisted of one warm-up exercise for 2 minute duration and ended with 1 minute duration of arm circles.

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APPENDIX F

Diabetes Knowledge Questionnaire (Garcia, Villagomez, et. al., 2001). Used under fair use guidelines, 2011. (English Version):

Item #	Questions	Yes	No	I don't know
1	Eating too much sugar and other sweet foods is a cause of diabetes.			
2	The usual cause of diabetes is lack of effective insulin in the body.			
3	Diabetes is caused by failure of the kidneys to keep sugar out of the urine.			
4	Kidneys produce insulin.			
5	In untreated diabetes, the amount of sugar in the blood usually increases.			
6	If I am diabetic, my children have a higher chance of being diabetic.			
7	Diabetes can be cured.			
8	A fasting blood sugar level of 210 is too high.			
9	The best way to check my diabetes is by testing my urine.			
10	Regular exercise will increase the need for insulin or other diabetic medication.			
11	There are two main types of diabetes: type 1 (insulin-dependent) and type 2 (non-insulin dependent).			
12	An insulin reaction is caused by too much food.			
13	Medication is more important than diet and exercise to control my diabetes.			
14	Diabetes often causes poor circulation.			
15	Cuts and abrasions on diabetics heal more slowly.			
16	Diabetics should take extra care when cutting their toenails.			
17	A person with diabetes should cleanse a cut with iodine and alcohol.			
18	The way I prepare my food is as important as the foods I eat.			
19	Diabetes can damage my kidneys.			
20	Diabetes can cause loss of feeling in my hands, fingers, and feet.			
21	Shaking and sweating are signs of high blood sugar.			
22	Frequent urination and thirst are signs of low blood sugar.			
23	Tight elastic hose or socks are not bad for diabetics.			
24	A diabetic diet consists mostly of special foods.			

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Diabetes Knowledge Questionnaire (Spanish Version):

Item #	Preguntas	Sí	No	No sé
1	El comer mucha azúcar y otras comidas dulces es una causa de la diabetes.			
2	La causa común de la diabetes es la falta de insulina efectiva en el cuerpo.			
3	La diabetes es causada porque los riñones no pueden mantener el azúcar fuera de la orina.			
4	Los riñones producen la insulina.			
5	En la diabetes que no se está tratando, la cantidad de azúcar en la sangre usualmente sube.			
6	Si yo soy diabético, mis hijos tendrán más riesgo de ser diabéticos.			
7	Se puede curar la diabetes.			
8	Un nivel de azúcar de 210 en prueba de sangre hecha en ayunas es muy alto.			
9	La mejor manera de checar mi diabetes es haciendo pruebas de orina.			
10	El ejercicio regular aumentará la necesidad de insulina u otro medicamento para la diabetes.			
11	Hay dos tipos principales de diabetes: tipo 1 (dependiente de insulina) y tipo 2 (no-dependiente de insulina).			
12	Una reacción de insulina es causada por mucha comida.			
13	La medicina es más importante que la dieta y el ejercicio para controlar mi diabetes.			
14	La diabetes frecuentemente causa mala circulación.			
15	Cortaduras y rasguños cicatrizan más despacio en diabéticos.			
16	Los diabéticos deberían poner cuidado extra al cortarse las uñas de los dedos de los pies.			
17	Una persona con diabetes debería limpiar una cortadura con yodo y alcohol.			
18	La manera en que preparo mi comida es igual de importante que las comidas que como.			
19	La diabetes puede dañar mis riñones.			
20	La diabetes puede causar que no sienta en mis manos, dedos y pies.			
21	El temblar y sudar son señales de azúcar alta en la sangre.			
22	El orinar seguido y la sed son señales de azúcar baja en la sangre.			
23	Los calcetines y las medias elásticas apretadas no son malos para los diabéticos.			
24	Una dieta diabética consiste principalmente de comidas especiales.			

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APPENDIX G

Center for Epidemiologic Studies Depression Scale (CES-D) (Brown University). Used under fair use guidelines, 2011. (English Version):

Depression Scale					
		During the Past Week			
Item #	Question	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1	I was bothered by things that usually don't bother me.				
2	I did not feel like eating; my appetite was poor.				
3	I felt that I could not shake off the blues even with help from my family or friends.				
4	I felt I was just as good as other people.				
5	I had trouble keeping my mind on what I was doing.				
6	I felt depressed.				
7	I felt that everything I did was an effort.				
8	I felt hopeful about the future.				
9	I thought my life had been a failure.				
10	I felt fearful.				
11	My sleep was restless.				
12	I was happy.				
13	I talked less than usual.				
14	I felt lonely.				
15	People were unfriendly.				
16	I enjoyed life.				
17	I had crying spells.				
18	I felt sad.				
19	I felt that people dislike me.				
20	I could not get "going."				

Scoring: Zero for answers in the first column, 1 for answers in the second column, 2 for answers in the third column, 3 for answers in the fourth column. The scoring of positive items is reversed

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(questions 4, 8, 12, and 16). Possible range of scores is zero to 60. Score of 16 or greater is considered depressed.

(Spanish Version)

Escala de Depresión					
		Durante la semana pasada			
#	Pregunta	Rara vez o no del tiempo (menos de 1 día)	Algunos o un poco del tiempo (1-2 días)	De vez en cuando o una moderada cantidad de tiempo (3-4 días)	La mayoría o todo el tiempo (5-7 días)
1	Estaba molesto por las cosas que normalmente no me molesta.				
2	Yo no siento deseos de comer, mi apetito fue deficiente.				
3	Me sentía que no podía sacudir la tristeza, incluso con la ayuda de mi familia o amigos.				
4	Me sentí tan bien como otras personas.				
5	Tuve problemas para mantener mi mente en lo que yo estaba haciendo.				
6	Me sentí deprimido.				
7	Sentí que todo lo que hice fue un esfuerzo.				
8	Me sentí esperanzado sobre el futuro.				
9	Pensé que mi vida ha sido un fracaso.				
10	Sentí miedo.				
11	Mi sueño era inquieto.				
12	Yo estaba feliz.				
13	Hablé menos de lo habitual.				
14	Me sentí solo.				
15	Personas fueron hostiles.				
16	He disfrutado la vida.				
17	Estuve llorando hechizos.				
18	Me sentí triste.				
19	Sentí que la gente me gusta.				
20	No sentía con animos.				

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APPENDIX H

Qualitative Follow-up Survey (English version):

Patient Code: _____

Please recall the diabetes study which occurred last year starting on the 29th of June 2009 and ended on the 17th of December 2009 at the JMA clinic. I have a few questions that will help me to complete the research and improve diabetes medical care.

What prevented you from coming to the clinic on all the days assigned for you to take part in the diabetic program?

To what extent did the political situation make you uncomfortable attending the clinic? (Circle one)

Not at all

Made me a little
uncomfortable

Made me
uncomfortable

Made me very
uncomfortable

To what extent will the activities that you learned in this diabetes program help you long term with your diabetes?

How happy were you with your weight loss at the close of the study, 17 December 2009?

Have you been able to maintain your weight level as it was at the end of this study?

What was most difficult about fully participating in this study?

Thank you for your participation and maintaining your treatments at the James Moody Adam's Clinic.

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Qualitative Follow-up Survey (Spanish version):

Patient Code: _____

Recuerde por favor el estudio de la diabetes que ocurrió el año pasado comenzando en el 29no del Junio de 2009 y terminado en el 17mo del Diciembre de 2009 en la clínica de JMA. Tengo algunas preguntas que me ayuden a terminar la investigación y a mejorar asistencia médica de la diabetes.

¿Qué evitó que usted viniera a la clínica en todos los días asignados para que usted participe en el programa diabético?

¿En qué medida lo hizo la situación política le hicieron incómodo atendiendo a la clínica?
(Círculo uno)

Nunca	Hecho me un poco incómodo	Hecho me incómodo	Hecho me muy incómodo
-------	------------------------------	----------------------	--------------------------

¿En qué medida las actividades que usted le aprendió en esta ayuda del programa de la diabetes de largo plazo con su diabetes?

¿Cómo feliz era usted con su pérdida de peso en el cierre del estudio, 17 de diciembre de 2009?

¿Usted ha podido mantener su nivel del peso pues estaba en el final de este estudio?

¿Sobre qué el más difícil participaba completamente en este estudio?

Gracias por su participación y mantener sus tratamientos en la Clínica James Moody Adams.

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APPENDIX I

Qualitative Follow-up Survey						
<i>Question 1: What prevented you from coming to the clinic on all the days assigned for you to take part in the diabetic program?</i>						
n	Work	Family Obligations	There were no issues	Medical	Distance too much	Money
1		Lack of time, had to take care of son.				
2	Work					
3	Work					
4			There was no impediment			
5				Pain in my bones seem to be arthritis		
6	The time because got a job					
7	Work					
8					The distance from where I live	
9			Came every day			
10			Came for the majority of time for the program			
11			Nothing, came every day			
12						Short on money
13	I had work commitments					

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Qualitative Follow-up Survey				
<i>Question 2: To what extent did the political situation make you uncomfortable attending the clinic? (Circle one)</i>				
n	Not at all	Made me a little uncomfortable	Made me uncomfortable	Made me very uncomfortable
1	X			
2	X			
3	X			
4			X	
5		X		
6			X	
7	X			
8	X			
9	X			
10		X		
11		X		
12			X	
13	X			

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Qualitative Follow-up Survey					
Question 3: To what extent will the activities that you learned in this diabetes program help you long term with your diabetes?					
n	Prevention	Helped	Lower Weight	Control Glucose	Nutrition
1	I feel better and learned a lot of things like prevention				
2			Yes and a lot because I lowered my weight		
3		Yes, helped			
4		It helped a lot			
5	It was a great help to read the manuals				
6				Helped a lot with my glucose	
7		It helped a lot			
8	Yes, a lot of advice				
9	It helped in prevention				
10	I advise my mother				
11		It helped me feel good			
12					It helped a lot with regards to food
13	The practice exercises helped to control my weight as well as the advice on nutrition				

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Qualitative Follow-up Survey			
Question 4: How happy were you with your weight loss at the close of the study, 17 December 2009?			
n	Felt Okay	Happy	Very Happy
1			Very happy and calm
2			Very happy
3	I did not lose much weight		
4			Very happy
5		I lost little weight but I was happy	
6		I was 90% happy	
7	I have always been thin		
8			I was very happy
9			Very happy
10			Very satisfied
11			I was very content
12		Happy and content with a lot of things	
13	I would have liked to have lost more weight, but for how undisciplined I was I obtained good results		

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Qualitative Follow-up Survey				
<i>Question 5: Have you been able to maintain your weight level as it was at the end of this study?</i>				
n	Yes	Yes, with fluctuations	Yes, lowered weight more	No
1				No, wasn't able to maintain because had to move for a time.
2			It lowered more	
3	I am maintaining my weight			
4	I am maintaining			
5	Yes, I have been able to maintain my level of weight and continue with my diet			
6			Lowered more with my diet	
7	Yes, I have maintained my weight			
8			It has lowered more each day	
9	Yes, I have maintained			
10			I have lowered more	
11		Yes, I maintained but my glucose level is always elevated		
12	Yes, I am maintaining			
13		In general yes, I have had variations in my weight since then but they have not been very significant.		

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Qualitative Follow-up Survey						
<i>Question 6: What was most difficult about fully participating in this study?</i>						
n	Exercise	Time management	Diet	Travel	Exercise and Diet	Nothing
1	The exercise was more difficult					
2					The exercises and diet	
3		The time because of work				
4	The exercise for my age (69 years old)					
5	The exercise					
6	The exercise					
7			I found the diet to be very difficult			
8			Diet, because I wasn't able to always buy			
9	The exercise					
10						Nothing was difficult
11				The distance that I live. I still follow the exercise		
12	The time, having to do a lot of exercise					
13		I did find it a little difficult to integrate completely into the study for it to have counted for much				