CARDIOVASCULAR DISEASE RISK IN GRENADIAN WOMEN

by

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To my family and friends, thank you for encouraging me, supporting me, and

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Thank you, to Dr. Denise Bates-Fredi for believing in me and reassuring me that I

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And, thank you to my husband, Kennon, you inspire me to be my best. I love you.

ABSTRACT

Objective: To assess the knowledge and understanding of dietary behavior as risk factors for hypertension among the female residents of Grenada, West Indies.

Design: A Cross-sectional, population study using an interviewer assisted questionnaire developed and validated for the study. The questionnaire consisted of questions on medical history of hypertension, weekly food consumption, body measurements, and a modified 16 question behavior-knowledge questionnaire.

Subjects: A convenience sample (n = 100) of Grenadian women, aged 18-84, who attended Health Fairs and Clinics around the Island.

Results: A regression analysis found there to be no significant association between total dietary knowledge scores and blood pressure (t = -1.33, p = 0.19). Logistic regression was then used to determine the predictive power of the control variables on hypertension diagnosis. Age and body mass index were the only two variables that were found to be significant, Wald x^2 (1) = 17.02, p < 0.001 and Wald x^2 (2) = 9.82, p < 0.05, respectively. A chi-square test of independence analysis found there to be a significant positive relationship between adding salt to meals and blood pressure (x^2 (1) = 6.20, p = 0.01), and eating sweets and blood pressure (x^2 (3) = 10.94, p = 0.01). Women who have been previously diagnosed as having hypertension are 3.88 times more likely to add salt to their meal than a woman who has not been previously diagnosed with hypertension. Women who eat sweets are more likely to be diagnosed with hypertension than women who choose to never eat sweets.

Conclusions: Findings suggest that women in Grenada, West Indies were aware of dietary behaviors associated with hypertension, however, there was no association between their knowledge and their blood pressure diagnosis. A little less than half the women surveyed were previously diagnosed as hypertensive, and continued to add excess salt to their food. Continuous efforts in dietary intervention are needed to ensure that future efforts to reduce morbidity and mortality from non-communicable disease risk factors among women in Grenada are met with success.

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LIST OF ABBREVIATIONS

AHA – American Heart Association

BMI – Body Mass Index

BP – Blood Pressure

CAD – Coronary Artery Disease

CDC – Center for Disease Control

CVD – Cardiovascular Disease

DALYs – Disability Adjusted Life Years

GDP – Gross Domestic Product

GHP – Grenada Heart Project

GND – Grenada, West Indies

HP- Health People

LMIC – Low and Middle-Income Country

LVH – Left Ventricular Hypertrophy

Na – Sodium

NCD - Non-Communicable Disease

OHOM – One Health, One Medicine

PA – Physical Activity

SES – Socioeconomic Status

SGU – St. George's University, Grenada, West Indies

USDHHS – United States Department of Health and Human Services

USNHANES – United States National Health and Nutrition Examination Survey

WHF – World Heart Federation

WHO – World Health Organization

CHAPTER I

INTRODUCTION

Centuries ago, communicable diseases were threatening lives around the

world. Over time, vaccinations and sanitation guidelines aided to control the

outbreak of infectious disease, promoting longevity for mankind (Popkin, 1999).

However, the absence of disease did not guarantee good health, even with an

abundance of research and advancements in medicine, there was a significant

gap in health (World Health Organization, WHO, 2014). This is still true today.

Diseases transitioned from infectious to non-communicable disease at an

alarming rate predominantly in well-developed countries and now we are seeing

the transition progressing in low-and-middle income countries (LMIC) (Popkin,

1997; Popkin, 2006).

Of these non-communicable diseases, cardiovascular disease is the

leading cause of mortality worldwide (Kearney et al., 2005), and hypertension is

the leading risk factor of mortality for cardiovascular disease (Beaglehole & Yach,

2003). This increase in non-communicable disease in LMIC can be contributed to

lifestyle choices and the westernized influence of urbanization. (Joshi, Jan, Wu,

& MacMahon, 2008). When urbanization, a gradual increase of the proportion of

people and structures in a once rural area producing a more urbanized

community, of a country happens rapidly it can lead to an undesired nutritional

transition (Kearney, 2010). This nutritional transition consists of the introduction

of poor eating habits which are associated with rising rates of non-communicable

diseases and its risk factors (Kearney, 2010). The development of the nutrition

transition has been deliberated and researched for many years in developed

countries, but recently, developing countries are starting to see a negative shift in

food consumption because of rapid urbanization (Kearney, 2010). Numerous

studies have found that there is a significant relationship between negative

dietary choices and non-communicable disease. Diets that are energy dense and

high in fat contribute to a rise in non-communicable disease risk factors (Popkin,

2006). To evade negative dietary changes, intervention studies suggest that

improving dietary knowledge plays an essential role in improvements in food

intake (Worsley, 2002). Developed countries such as the United States, the

United Kingdom, Australia, and Nordic countries have provided evidence that

positive dietary changes, such as increasing the intake of whole grains, fruits and

vegetables, and increasing the ratio of polyunsaturated to saturated fats, led to a

downward trend of cardiovascular disease (Pomerleau, Lock, Khai, & Mckee,

2005), leading to the establishment of successful nutrition education and

intervention programs. However, according to data from the Food and Agriculture

Organization (FAO) of the United Nations, much of the world population is not

currently meeting a recommended diet. The Food and Agriculture Organization's

research states that effective interventions are even more essential in developing

countries (Farrington, Grim, Grim, & Shatchkute, 2007). Research from high-

income countries was instrumental in concluding that the transition to

degenerative, non-communicable disease, is avoidable, and that understanding

patterns in behavior and changes in communities is an important step in the

prevention of these unnecessary, deadly diseases. This epidemiolocal transition of disease is still increasingly prevalent in low-and-middle income countries, and in order to make changes in these developing countries, behaviors and attitudes surrounding diet related non-communicable disease need to be explored further (Popkin, 2006).

Background

Two-thirds of deaths worldwide are due to non-communicable disease and almost 75% occur in lower-resourced settings (WHO, 2017). Through preventative measures, risk factors for cardiovascular disease can be reduced, unfortunately, despite modern technology and advancements in health care, cardiovascular disease has yet to be conquered (Morenoff et al., 2007). Managing a risk factor of cardiovascular disease affects the disadvantaged and poverty-stricken areas tenfold, these individuals are faced with the fact that they are unable to work, yet are still expected to pay the high treatment costs of their disease (Popkin, 1997; Popkin, 2006). This disparity in health of individuals in low-and-middle income countries is morally disconcerting. Research has shown that strategies to prevent the non-communicable disease epidemic from reaching its full proportion are available (Pomerleau, Lock, Khai, & Mackee, 2005), and with today's technology and advancements, there is no reason why these strategies are not already in all low-and-middle income countries. The World Health Organization sustainable development goal for 2015 was to reduce premature deaths from non-communicable disease by 30% by 2030 (WHO,

2017). Policy makers, governmental agencies, and scholars need to come together to fight non-communicable disease mortality in developing countries. In 2007, Food-Based Dietary Guidelines (FBDG) were developed for the general population in Grenada, West Indies. These guidelines were put in place to promote healthful diets and encourage behavior changes. To ensure that the general public participated and continued these dietary practices, the FBDG recommend that the effort should be made to monitor and evaluate the community to determine the reach, frequency, and impact of the FDBG (Albert, 2007). Since then, there has been very limited research published on non-communicable disease risk factors that are associated with the FDBG. And, according to the ministry of health, no research has been conducted specifically on women's dietary risk factors or hypertension in Grenada (G. Mitchell and F. Martin, personal communication, October 30, 2015). To achieve the WHO's goal in Grenada, identifying the understanding of behaviors associated with lifestyle changes would be needed to establish education and prevention measures to reduce the risk factors of non-communicable disease.

PEN-3 Cultural Model of Health

Many health theories have been formed to explore and understand beliefs and behaviors associated around an individual's health choices. The PEN-3 cultural model, developed by Airhihenbuwa in 1989, is different from most other models in that it places cultural influence at the center of understanding health problems and behaviors. This is an important emphasis as culture is used to

shape and connect an individual's perceptions and actions that are formed

regarding a health behavior (Airhihenbuwa et al., 2012). Another reason the

PEN-3 model is different from other health behavior models is that it focuses on

positive protective factors such as family and the environment and the role that

they play on decision making among African Americans. Whereas, other health

behavior models tend to only address the negative health behaviors. The goal of

the PEN-3 model is to focus on connecting and solidifying personal strengths

which could act as buffers against disease rather than focusing on personal

weakness and symptoms of disease (Airhihenbuwa et al., 2012). The PEN-3

model has been successful in using cultural context as a means of exploring

different health conditions (e.g. HIV/AIDS, cancer, smoking, and diet) and their

impact on the health of an individual and health solutions (Iwelunmor, 2013). This

model is important to this study because it provides the opportunity to primarily

focus on cultural practices that are associated with positive health behaviors,

while also acknowledging the practices that have a neutral impact on health, and

identifying the negative factors that are likely to have a harmful influence on

health and combining them in a way that create a cultural transformation to

benefit health. (Airhihenbuwa et al., 2012; James, 2004). The PEN-3 model was

utilized by the researcher when analyzing the culture to develop the

questionnaire and interview methods.

Characteristics of Cardiovascular Disease and Hypertension

Globally, in 2015 an estimated 7.4 million deaths were attributed to coronary artery disease, the most prevalent of the cardiovascular diseases (WHO, 2017). As previously stated, hypertension, high blood pressure, is the most significant risk factor in cardiovascular disease mortality (Lawes, Hoorn, & Rodgers, 2008). In 2008, it was estimated that approximately 40% of the world's population of adults 25 and older had high blood pressure. (WHO, 2017).

Disparities in health is not a recent phenomenon. Researchers have been deliberating the topic for decades and yet, there is a considerable amount of exploration essential to make the changes needed for equal health for all (Morenoff et al., 2007). Initially "Healthy People" goals were designed to reduce disparities among Americans and today, the 2020 goals aim is to not only lessen disparities, but to achieve health equity nationwide. The goal further clarifies that ongoing societal efforts should be made to address the avoidable inequalities from the modern and historical injustices regarding health and health care discrepancies. To reach this goal, determinates of health, factors that influence a person or population, are to be addressed (CDC, 2015). While, Healthy People is specific to the United States, health equality goals for developing countries exist as well. In the Fall of 2016, the World Health Organization (WHO) partnered with health organizations around to world to create a new initiative to combat cardiovascular health which they called The Global Hearts Initiative. The Global Hearts initiative plans to follow programs used in the United States and Finland

that have successfully reduced cardiovascular disease mortality in men by 40 and 80 percent, respectively. The intention is to use these programs that were successful in wealthier countries in countries with limited resources by providing tobacco taxation, reducing salt in foods that are imported, detecting and treating individuals who are at high risk for cardiovascular disease and strengthening primary health care (WHO, 2017).

Results of Rapid Urbanization of Developing Countries

The prevalence of hypertension is increasing exponentially in developing low-and-middle income countries. Urbanization and lifestyle changes are believed to be primary factors (Beaglehole & Yach, 2003). Illiteracy rates, poor access to health care facilities, bad dietary habits, poverty, and cost of drugs are increasing along with urbanization in these developing areas (Ibrahim, 2012). There are both positive and negative aspects of urbanization, but in LMIC the negative seems to supersede the positive when it comes to health of the community. The urbanization of low and middle-income countries has generated an increase in food consumption of sweeteners, fats, meats, and refined carbohydrates. However, the health care systems in developing countries are not progressing along with urbanization, which contributes to inadequate medical care because of low funds, poor infrastructure, and under representation of medical professionals (Moore, Gould, & Keary, 2002). This unproportioned outcome of urbanization leads to health disparities both with-in and between countries.

Numerous research studies have concluded that health status is correlated to resources and characteristics of the community. Thus, the community is the focus of the Global Heart Initiative in LMIC. Individuals who live in low income neighborhoods have poorer health outcomes that are related to the characteristics of said neighborhood (Alder & Stewart, 2010). In developing countries, the spread of obesity is parallel with the globalization of the food systems and the expansion of trade. The shortage of fresh markets and the increase of cheap and unhealthy foods have led to negative food consumption trends that result in obesity and hypertension (Kearney, 2010). Fresh food markets are a convenient way to get an abundance of fresh fruits and vegetables to local community members. Fresh markets in developing countries are being swapped for large super market chains dominated by multi-national corporations that now allow for increased access to cheaper processed foods, foods high in fat, foods high in added sugar, and foods that are high in salt (Kearney, 2010). The objective for introducing supermarkets was not maltreatment of the community. In early decades supermarkets helped to establish means for pasteurization and refrigeration of milk and other substantial improvements in the standards of food quality and safety (Kearney, 2010), milk and other products became cheap, safe, and convenient for consumers (Popkin, Adair, & Ng, 2012). Unfortunately, the food systems changed considerably with the globalization and distribution of technology related to food production. Which resulted in the increase in availability of cheap unhealthy food since supermarkets are the largest providers of processed, high-fat, added sugar, and salt-laden foods

(Kearney, 2010). Epidemiologic and biochemical evidence suggest that this new westernized diet in developing countries resulting from marketing techniques, trade freedom with foreign suppliers, and processed food sales are to blame for the increases in the chances for hypertension and other cardiovascular disease risk factors (Remig et al., 2010).

Consequences of Advertising of Unhealthy Foods

Marketing of unhealthy foods can be placed as a principal argument of the supermarkets role on diet-related noncommunicable disease risk factors. In 1945 in the developed country of the United States, Americans drank four times more milk than soft drinks (Putnam & Allshouse, 1999). In 2010, Americans were consuming almost two and a half times as many soft drinks than milk (Kearney, 2010). The change in beverage consumption can be traced to the advertising and subsidies from the producers of corn syrup (Putnam & Allshouse, 1999). Marketing of corn syrup products reaches both adults and children through television and radio and is considered the single largest factor responsibility for childhood obesity. Early onset obesity puts these children at a greater risk of hypertension and other cardiovascular disease risk factors (Kearney, 2010). The availability of foods is substantially influenced by the food industry and food retailers, and today more people are overweight and obese than they are underweight or malnourished, especially in emerging countries (Popkin, 2006). The transition from excess milk to excess soft drinks in America resulted from a slow transition of urbanization that took around sixty years. Urbanization of

developing countries is not as leisurely; in fact, changes have taken place in Latin America in the transition of the economy and markets in a time span of ten years when it took America fifty years. From 1990 to 2000 supermarkets in South America and the Mexico saw their national retail sector position increase by an average of sixty percent (Dries, Reardon, & Swinnen, 2004). Today, processed food sales from supermarkets is substantially higher in developing countries like Latin American and the Caribbean than in developed countries like America and Europe (Kearney, 2010).

Unparalleled Medical Care

The outcomes of the nutrition transition from urbanization in developing countries are not supported by their medical systems because of the limited availability of primary health care physicians in these areas (Powell, 2007). A combination of preventative strategies, primary and secondary health care, and improved treatment of severe cardiovascular events have helped to reduce the rates of CVD mortality by three-quarters in high-income countries (WHO, 2017). However, the opposite is true for low-and-middle income countries which is the ill-fated reason for the widening gap in health inequity between the rich and poor (Joshi, 2008). In the most recent reports from the Global Health Workforce Statistics database, in 2013, there were approximately 2.6 physicians per 1,000 population in the United States, as compared to low-and-middle income Caribbean countries such as Barbados and Grenada who, in 2006, had

approximately 1.8 and 0.7 physicians per 1,000 population, respectively (Kumar et al., 2015; WHO, 2016).

In the United States, CVD mortality rates have declined due to secondary prevention measures (WHO, 2017). Treatment gaps likely exist between high and LMIC countries due to barriers between the patient, doctor and health care system and by the limited availability of health care providers. In LMIC, some barriers are believed to be deficiency of guidelines by physicians and other health care workers and negligible adherence to treatment due cost and stigma associated with taking medications (Farrinton, Grim, Grim, & Shatchkute, 2007). Major efforts will be needed to develop and implement strategies for reducing and preventing cardiovascular disease risk factors in low-and-middle income countries, this will require treatments that are cost effective, culturally appropriate, and are sustainable (Joshi, 2008).

Statement of Problem

James (2004) found that directing nutrition education programs towards women are beneficial in that most often women are the decision makers for their family and are concerned with the health of their family. Using the PEN-3 model, James could identify cultural factors that affected dietary intake, knowledge, and attitudes towards nutrition in African American women residing in a low-income community in north central Florida (James, 2004). Solutions to health problems that are designed to encourage and focus on the positive values rather than the negative are better sustained, and placing culture at the core of development,

implementation, and evaluation results in successful interventions (Airhenbuwa et al., 2012). Efforts and results pertaining to diet related disease have been proficient in developed countries. Unfortunately, the high prevalence of hypertension in women of African descent in low-and-middle income countries is distressing. Women and families are suffering in these developing countries because they lack the resources and education needed to combat diet-related noncommunicable disease risk factors (Jones, 2010). Considerable efforts are needed to understand culture and beliefs surrounding food production, distribution, marketing, and knowledge in developing countries. Grenada, West Indies is classified as a low to middle-income country based on Gross Domestic Product and has been undergoing changes in the economy and infrastructure because of urbanization. Women and men alike are experiencing a higher prevalence of hypertension and other noncommunicable disease risk factors (Bansilal, 2012). In meeting with a Professor of Public Health at St. George's University, it was determined that understanding behaviors and knowledge regarding health choices is necessary to make healthier changes in the country, and the emphasis should be on women as they are the ones who do the shopping and the cooking for the family and push for better health the family (Dr. Satesh Bidaisee, personal communication, January 1, 2015).

The purpose of the study was to examine the relationship between cardiovascular disease risk factors and dietary behaviors of Grenadian women. Women self-reported previous diagnosis of hypertension by a health professional

and answered a 16-item questionnaire associated with dietary related risk factors of disease. The goal of the study was to examine the relationship between cardiovascular disease risk factors and dietary behaviors. By assessing the knowledge of dietary risk factors associated with hypertension the researcher can determine the best interventions needed to combat cardiovascular disease among women in Grenada, West Indies. The purpose of this cross-sectional study was to answer the questions:

1. When controlling for work status, age, and education level to what extent do the women living in Grenada, West Indies, associate their dietary behaviors with the risk of hypertension?

2. And when controlling for work status, age, and education level, what is the relationship between diet and hypertension among women in Grenada, West Indies?

Study Implications

Making a change in dietary behavior can be a challenge especially in certain cultures. It is important to understand what beliefs and perceptions are associated with these behaviors. Several researchers have found success with cultural aspects of African American's eating patterns using the PEN-3 Model. This allows for the creation of an appropriate framework for assessing how community and culture are underlying factor needed for health promotion and disease prevention (Airhihenbuwa, 2012; James, 2004). Findings from this study

were used to identify gaps in health knowledge that could be used to recommend the most evidence-based improvements to health promotion and disease prevention that would reduce disparity and degenerative disease among women in Grenada, West Indies.

CHAPTER II

REVIEW OF LITERATURE

What is Hypertension?

This epidemiologic transition from childhood infectious disease to adulthood degenerative lifestyle disease has been an enduring consequence resulting from modern medical care that extends life expectancy and unhealthy lifestyle behaviors. Diseases have transitioned from infectious disease and malnutrition to non-communicable disease at an alarming pace in low-and-middle income countries (LMIC) as a result of the westernized influence and development of these countries. (Joshi, Jan, Wu, & MacMahon, 2008). Unhealthy lifestyle choices are leading to a higher prevalence of risk factors for degenerative disease. These risk factors are resulting in loss of healthy years lived, reversing what modern medicine has aimed to achieve (Dozier, Block, Levy, Dye, & Pearson, 2008). Today, these degenerative diseases, or non-communicable diseases (NCD), account for 60% of deaths worldwide, taking the lives of 38 million people every year. Cardiovascular disease (CVD) is the most prevalent NCD and every year it accounts for approximately 17.5 million mortalities. More people die annually from CVD than any other cause in all parts of the world (WHO, 2017). The leading risk factor of mortality for cardiovascular disease is hypertension (Kearney et al., 2005).

Figure 1. Presents the stages of hypertension. Ideal blood pressure is a systolic reading of 120 mmHg and a diastolic reading of less than 80 mmHg, anything over this puts an individual at risk for hypertension. In 2010, the World Health Organization estimated that approximately 1.3 billion people suffered from raised blood pressure: that is 31% of adults 25 and older worldwide (Mills et al., 2016).

Blood Pressure Category	Systolic mm Hg (upper #)		Diastolic mm Hg (lower #)
Normal	less than 120	and	less than 80
Prehypertension	120 – 139	or	80 – 89
High Blood Pressure (Hypertension) Stage 1	140 – 159	or	90 – 99
High Blood Pressure (Hypertension) Stage 2	160 or higher	or	100 or higher
Hypertensive Crisis (Emergency care needed)	Higher than 180	or	Higher than 110

Figure 1. Stages of Hypertension copyright 2010 from the American Heart Association.

As previously stated, hypertension is the chief risk factor for cardiovascular disease (Beaglehole & Yach, 2003). Hypertension is abnormally high blood pressure that causes a state of physiological stress on the body (American Heart Association, AHA, 2015). The total number of adults diagnosed with hypertension in 2010 was 1.3 billion, approximately 349 million were in high-income countries and 1.04 million were in economically developed countries (Mills et al., 2016) . It is predicted that by 2025, if nothing is done to combat

hypertension, then nearly 1.56 billion people worldwide will succumb to the most

prevalent risk factor for cardiovascular disease (Kearney et al., 2005).

Today, the prevalence of hypertension is on the rise and is reaching

extreme proportions, and nowhere is death and disability from NCD risk factors

more prominent than in developing low-and-middle income countries (Joshi et al.,

2008). From 2000-2010, the age-standardized prevalence of hypertension in

high-income countries decreased by 2.6% and in low-and-middle income

countries it increased by 7.7% (Mills et al., 2016). In the same decade,

awareness, treatment, and control of a hypertensive diagnosis increased

substantially in high-income countries, while in low-and-middle income countries

awareness and treatment increased only slightly and control increased even less

(Mills et al., 2016).

The persons at high risk for hypertension within these developing

countries are those of African descent, (Block, Dozier, Hazel-Fernandez, Guido,

& Pearson, 2012) and, more specifically, hypertension contributes to more

deaths than any other preventable risk factor in women who are of African

descent (Forman, 2009). The impact of a health problem is often quantified by

the number of years lost to disease. Not only is hypertension the leading risk

factor for mortality, it is third in line for the cause of disability adjusted life years

(DALYs) (Kearney & McElhone, 2007). Acosta's et al. (2010) prediction of a 20%

increase in chronic death worldwide in LMIC is detrimental to society because

the diagnosis of non-communicable disease risk factors in individuals from the

working class disproportionality contributes to lost potential years of a healthy, employed life (Joshi et al., 2008). Lawes et al. (2008) found that in 2007, there were 7.6 million premature deaths and 92 million DALYs worldwide that were attributed to hypertension.

Years lost working are not the only concern from degenerative illnesses; researchers have found that it can significantly impact economic growth (Joshi et al., 2008). In 2006, 6.8 billion United States (US) dollars of gross domestic product (GDP), measure of a countries' economy in total value of goods produced and services provided within that country in a given amount of time in LMIC were lost as a consequence of CVD risk factors. Joshi et al. (2008) estimated, based on reported data, that in a time span of 10 years, what would be equivalent to 84 billion US dollars of economic production vanished due to non-communicable disease alone.

The Burden of Hypertension

The behavioral risk factors for non-communicable disease are smoking, excess weight and obesity, alcohol consumption, diet and nutrition, and physical inactivity (Ezzati & Riboli, 2013). Global disparities in lifestyle factors of hypertension is substantial and increasing at a rapid rate. Plans to combat the hypertension burden in low-and-middle income countries are essential, and begin with behavioral modifications (Farrinton, Grim, Grim, & Shatchkte, 2007).

The United States Health and Human Services department sponsored a study that established that dietary habits of many African Americans in the US are excessively high in calories, fat, and sodium due to the consumption of foods that are salt-cured, smoked, fried, and nitrite-cured (Whitt-Glover, 2013). The diet habits of residents living in the Caribbean are not far from that of US African Americans. Caribbean diets today consist mostly of liberal amounts of fatty sea food (for example: lambie-conch- and fish), starchy vegetables (for example: peas and corn), fruit juices, packaged crackers and snacks, and foods that are cooked in coconut or vegetable oils (Dozier et al., 2008).

Numerous studies have stressed the importance of modifications to diet in order to reduce the incidence of cardiovascular disease risk factors (Marmot, 2007). However, modifying one's diet is not an easy task. There is an overall negative perception of eating healthy within communities, especially African American communities, which claim that dietary changes are one of the hardest undertakings (Lin & Yen, 2010). African Americans and Afro-Caribbean's view dietary change as giving up a part of heritage or conforming to a dominant culture by eliminating their cultural ways of cooking (James, 2004). Their adoption of particular dietary habits and cooking methods stems from African American history and is a combination of West African, British, Spanish and Native American cooking methods to form a combined technique which is known today as soul food (Dozier et al., 2008). The food preparation and technique of the Caribbean Island of Grenada, West Indies is a blend of Indian, French, and

other Caribbean backgrounds, putting a spin on African American soul food.

Consuming a soul food rich diet along with adapting and consuming westernized

foods increases the risk of diet related cardiovascular disease risk factors tenfold

(Dozier et al., 2008). This is why exploration of dietary changes to improve health

has been imperative, especially among low and middle-income countries like the

Caribbean islands.

The PEN-3 Cultural Model

Researchers have used many theoretical models to challenge dietary

behavior change and have found success with cultural aspects of African

American's eating patterns using the PEN-3 Model (Airhihenbuwa et al., 2012;

James, 2004). The Pen-3 Health Education model was created by Arihihenbuwa.

There are three domains that make up the PEN-3 model to explore the impact of

culture on health as seen in figure 2. The domains are: cultural identity,

relationships and expectations, and cultural empowerment. Each of these

domains are broken down into three factors from the P.E.N. acronym. The fist

domain, cultural identity, is comprised of person, extended family, and

neighborhood, and it highlights the intervention points of entry. The second

domain, relationships and expectations is comprised of perceptions, enablers,

and nurtures. This domain explores the perceptions or attitudes about health

problems, the societal or structural resources that promote or discourage

effective health seeking practices, and the influence of family on nurturing

effective health problem management (Airhihenbuwa et al., 2012; James, 2004).

CULTURAL IDENTITY

RELATIONSHIPS
& EXPECTATIONS

Person
Extended Family
Neighborhood

Perceptions
Enablers
Nurturers

Positive
Existential
Negative

CULTURAL EMPOWERMENT
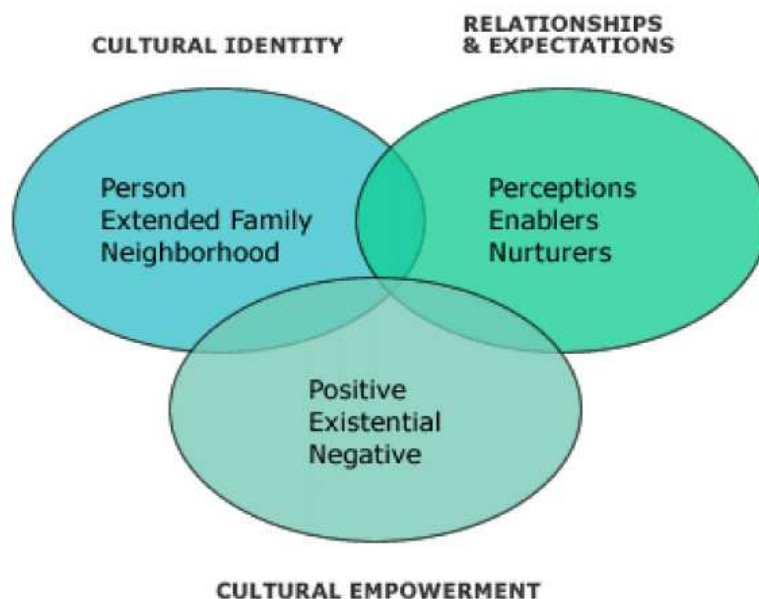
Figure 2. PEN-3 Cultural Model of Health circle graph copyright from Arihihenbuwa et al.(2012)

Whereas most interventions and health behavior models for dietary change focus on changing at the individual level, PEN 3 focuses on population and cultural changes to modify behavior. This a significant emphasis, especially with a community that has strong ties to their cultural history (James, 2004). Blake et al. (2011) conducted a qualitative study to interpret healthy eating behaviors and found that there is a complexity as to how people interpret healthy eating. Individuals base healthy eating on their personal, social and cultural experiences. When exploring how social support of families' affects individuals living with heart disease, diet changes and healthy habits become a way of life for the whole family and not just the individual (Gregory & Fisher, 2008). Self-

efficacy is an important factor to consider when making a behavior change, but when working with low-income communities, community and cultural based practices are most appropriate (Aboud & Singla, 2012). This concept has been supported by nutritional studies exploring social influences on eating and nutritional interventions since the 1990s. Individuals eating behaviors and habits are influenced by their social circle. For example, a person tends to eat substantially more when eating in a social situation. These findings are still concluded today (Robinson, Blissett, & Higgs, 2013).

The PEN- 3 cultural model suggest that to make a health behavior change within a culture, the first step is to identify the beliefs and manners that are practiced by a person, family, and/or neighborhoods. Once the beliefs and practices are determined, the next step is to encourage positive solutions to health behaviors by highlighting the values that are already practiced by the community (James, 2004). It is important not to simply point out negative health consequences that might serve as barriers, so the last step is to identify negative health consequences and use positive psychology to encourage healthy behaviors within a community or family setting (Iwelunmor, 2013). Constructive encouragement of community settings enables positive dietary changes. A study by King et al. (2006) exploring the dietary habits of individuals living with cardiovascular disease found that men were able to make healthy changes with the support and encouragement of their spouses. However, it was found that women were more likely to make healthy changes with the support of other

female family members or friends, concluding that women have more of a

positive influence on behavior changes within the family or their community.

Furthermore, James (2004) found that African American women were key agents

of cultural transformation because they are concerned with their families' health,

responsible for food preparation, and set standards for healthy and unhealthy

eating. The PEN-3 model provides researchers with a successful strategy for

identifying and encouraging healthy behaviors among African American women

for taking control of their own health as well as the health of their family and

community. The PEN-3 model aids in strengthen positive personal attributes that

help with understanding how people live and prosper in environments of

adversity (James, 2004).

The PEN-3 model was applied to this study via the investigator as she

immersed herself in the community by learning and understanding the cultural

beliefs and behaviors of the Grenadian people. The researcher spent

approximately fifteen months living in Grenada identifying their culture through

anecdotal ethnography. The researcher engaged with stakeholders of the

community to discuss such findings and the use of the PEN-3 cultural model to

establish an appropriate questionnaire. In 2006, Holdsworth et al. conducted a

study on Senegalese women to access the knowledge of dietary and behavior

related risk factors of non-communicable disease. Holdsworth et al. used a

health behavior knowledge questionnaire specifically designed for the study.

Each of the domains of items were check for internal consistency and all but one

indicated that the item-to-item correlation was acceptable. Understanding risk factors associated with cancer had a Cronbach's alpha score much lower than the desired level. It was determined that there was reasonable overall knowledge of dietary behavior risk factors for most non-communicable diseases. However, Senegalese women were unsure of the benefits of fruit and vegetable consumption on decreasing their chances of cancer diagnosis (Holdsworth et al., 2007). While the Holdsworth study did not utilize the PEN-3 cultural model, it did highlight the positive health behaviors and understanding of the Senegalese women. Using behavior change theories like the PEN-3 model have allowed researchers and health agencies to combat disease in underdeveloped areas around the world (Airhihenbuwa, 2012). It is through partnerships with governmental agencies on understanding of cultures that The World Health Organization (WHO) established a Global Hearts Initiative. The Global Hearts Initiative intends to exhaust the global threat of Non-communicable disease in developing, low and middle-income countries, because the risk of dying from high blood pressure in low-and-middle income countries at any given age is more than double that in high-income countries (Basu & Millett, 2013). Therefore, one of their main goals is to prevent and control cardiovascular disease in target developing countries by establishing community preventative care techniques. To establish this, a community assessment on health knowledge should be conducted and evaluated. Hence, the goal of this study was to assess health behavior knowledge of Grenadian women using parts of the PEN-3 cultural model.

The Effect of Urbanization on Health

As previously mentioned, one explanation for the rapid growth of degenerative disease in low and middle-income countries is the urbanization of rural communities (Dozier et al., 2008; Gaziano, Bitton, Anand, Abrahams-Gessel, & Murphy, 2008). Urbanization refers to the social, economic, and environmental transformations of once rural areas. The major distinction between rural and urban areas is the degree of concentration of a population. According to United Nations Statistics Division the desire to create a more urban environment of living is based on the principle that urban areas have a higher standard of living than rural areas (United Nations, 2017). Urbanization is the influx of rural residents who seek the advantages of urban life, that is, education, health care, and entertainment. More than half of the world population has been urbanized, and by 2030 urbanization is expected to affect nearly five billion people (Fernstrom, Reed, Rahavi, & Dooher, 2012).

While high quality living is a desired result of urbanization, regrettably, it is not always the outcome. Human health is at risk with urban growth because it is often met with poverty, environmental dilapidation, and population demands that outweigh service and capacity of a given town. As stated earlier, Urbanization of low-and middle-income countries has generated an increase in food consumption of sweeteners, fats, meats, and refined carbohydrates. The introduction of supermarkets into these communities is a major component of urbanization, supermarkets now offer processed foods that were previously uncommon in

these communities. These foods are designed specifically to withstand long travel periods (export and importation), to last for a long period of time on the shelves, and to be readily available to more people in the community. Processed foods are foods that are altered in some way during preparation. Not all processed foods are unhealthy, but some contain high levels of salt, sugar, and fat (Moore, Gould, & Kearny, 2002). A diet high in unhealthy processed foods is referred today as a "Western Diet" (Popkin, 1997). Epidemiologic and biochemical evidence suggest that a western diet, especially excessive trans-fats in the diet, increase chances for hypertension and other cardiovascular disease risk factors (Remig et al., 2010).

The rapid advancement of urban populations brings with it the consumption of more food, energy, and durable goods than rural populations. In addition, corporations seek to maximize profit from urban population with little regard to the developmental needs of the individual populations (Purvis, 2015). According to the United Nations Population Fund, the rise of inequality among humankind is the most obvious in urban areas of low-and-middle income countries (Abegunde et al., 2007). This is one of the most apparent shortcomings of urbanization (Purvis, 2015). The effect of substantial hardships on health becomes profound when determinants of health, such as environment, literacy level, availability of high-quality education, etc., unite and trigger illness (Adler & Stewart, 2010). In the United States, researchers explored poverty levels and their impact on health status and found that those individuals living below the

poverty line face more severe health issues than those living above the poverty line (Adler & Stewart, 2010). Thus, guiding researchers to focus on the relationship between occupational level and health status. Similarly, the Whitehall Studies investigated occupation status on the prevalence and mortality of cardiovascular disease. These two cohort studies on British civil servants found that there was a direct relationship between occupational hierarchy and health of a population living above the poverty line. Individuals at the bottom of the hierarchy had worse health outcomes and higher mortality than those at the top, and as one advanced occupational grades their health status increased (Marmot & Brunner, 2005). This discovery underlined the importance of the association between job status, social environment, and income inequality on health status (Alder & Stewart, 2010). And, while most research emphasize the association between socioeconomic status and health as a causal relationship, it can be argued that the direction cannot be firmly established. Smith (2005) contended that the status of one's health similarly affects their socioeconomic status. Smith found that Health Retirement Study participants who had episodes of poor health experienced a decrease in income due to health care costs or reduction in work hours. Also, women who are less educated and live below poverty are more likely to have babies who are born prematurely and have low birth rate (Kramer et al., 2001).

The circumstances around the relationship of socioeconomic status and health equity has been highly disputed. Some researchers claim that for low

socioeconomic status individuals, having basic resources is the groundwork towards better health. Others would argue that having a high sense of control would be more beneficial towards increasing health status among low socioeconomic status individuals (Alder & Stewart, 2010). Thus, creating a quandary of whether poor health is a personal or community matter.

As previously mentioned, every ten years the US Department of Health and Human Services (HHS) publishes Healthy People goals, which are evidence-based objectives set to achieve better health for all Americans. The goals for Healthy People 2020 target attaining high-quality health for all by eliminating disparities and improving the health of all groups (CDC, 2015). All or one of these factors can contribute to an individual's ability to achieve good health, thus causing a health outcome to have an excessive range between populations. In 2010, Jones discussed the ethical dilemmas around health disparities, stating that the mere existence of health disparities is morally wrong because they continue to represent prejudices throughout history (Jones, 2010). This claim is also backed by a Marmot (2007) which identified social factors, availability of resources to meet daily needs, access to education, economic opportunities, etc., as the root of many of the inequalities in health. These social factors or social disparities of health can be a significant burden to certain communities who are lacking in these resources (Ruger, 2006). There is an unparalleled distortion between the influx of unhealthy, processed foods in low income countries and nutritional knowledge and understanding of these foods.

The individuals living in this particular community are more likely to have poorer health, pain and suffering, thus not allowing for the worldwide goal of health equity to be reached (Fernstrom et al., 2012).

Prevalence of Hypertension in the Caribbean

The developing Islands of Latin America and the Caribbean are classified as low-and-middle income countries and 78% of the population is now urbanized (Matthews, 2013). As stated previously, the majority of this burden of hypertension is in developing low-and-middle income countries, and, within these countries, hypertension is diagnosed most often in the middle years of life (Lawes, Hoorn, & Rodgers, 2008). Because of this classification, various efforts have been led throughout Latin America and the Caribbean to reduce the incidence of NCD risk factors; however, in 2013, NCDs still accounted for 7 out of 10 deaths in these developing Island countries. Today, these numbers exceed the global average by 60% (Sharma et al., 2008). One such effort to reduce NCD risk factors in the Caribbean Islands was funded by the World Heart Federation (WHF). The study focused on NCD risk factors on the Island of Grenada, West Indies.

Background of Health and Healthcare in Grenada, West Indies

Grenada, West Indies is known as the "Spice Island" of the Caribbean. Located in the Windward Islands, Grenada is in conjunction with two smaller islands, Carriacou and Petit Martinique. Grenada is an English-speaking country

with a population of approximately 107,850 residents, 82% of which are of

African descent. Roughly half of the population is divided into male (50.22%) and

female (49.78%) (United Nations, 2016). Grenada ranks 203rd in size being only

334 square kilometers. This small size gives Grenada a high population density,

with nearly 318 people per square kilometer. Grenada is broken down in to seven

districts, or parishes. Approximately 34,000 people reside in St. George, the

capital of Grenada (World Population Review, 2017). Each of the seven districts

has its own health center, with the general hospital in St. George. The general

hospital has 240 beds and has an internal medicine, surgery, pediatrics,

psychiatry, pathology, obstetrics, gynecology, ophthalmology, oncology,

anesthetic, orthopedic, radiology, laboratory, and pharmacy units. However,

these units are not fully staffed. Grenada, as well as the rest of the Caribbean are

experiencing a shortage of medical professionals. Although, there are plenty of

medical students on the Island, St. George's University enrolls new students

biannually, they leave the Island to establish their practices. The physician-to-

population ratio in Grenada is 8.1 for every 10,000 people (Essays, 2013). In

comparison in the United States, there are 265.5 physicians for every 10,000

people (WHO, 2016). Hence, this limited access to health care as well as trade,

rapid urbanization, and environmental degradation create the conditions for the

cardiovascular disease epidemic in Grenada and many other LMIC to thrive.

Solutions do exist. Several high-income countries have demonstrated success in

the prevention of cardiovascular disease though behavior changes that are linked

to CVD risk factors and improvements in medical treatment. In August 2015, the

researcher met with professors of public health at St. George's University (SGU) to discuss the burden of non-communicable disease in Grenada. During this meeting, the researcher realized the need for supplementary research on knowledge and understanding of lifestyle behaviors associated with these diseases (Satesh Bidaisee, personal communication, August 2015). One of the ways that St. George's University, located in St. George, Grenada, is working to provide better health care to the island is by offering student run health clinics. These clinics are called One Health, One Medicine (OHOM). The goal of OHOM is to advance health care by enhancing public health and biomedical research discoveries by expanding interdisciplinary collaborations between human, animal, and environmental health care. The health fairs are conducted twice a semester in different towns/parishes around the Island of Grenada. The students from the School of Medicine, School of Veterinary Medicine, and School of Public Health provide wellness exams to humans and animals.

In January 2000, a visiting cardiology clinic began in St. George's, it was funded though the Medical school and donations from individuals around the community and the cardiologists. The clinic included cardiovascular exams, echocardiography, EKG, and a stress test. In May 2000, an emergency critical care (ECC) program was implemented. Before May 2000, there was no means of cardiac resuscitation in Grenada, West Indies (Bourne & Hansford, 2000). A decade later, A cardiac center was officially opened in St. George. The center

now has almost a dozen visiting cardiologist who provided longitudinal care to cardiac patients (Lanzieri & Eisenhauer, 2016).

Grenada is considered a low-to-middle income country with a Gross National Income of 10,690 per capita (Global Health Observartory, 2015). The goal of the World Heart Federation (WHF) project was to initiate an epidemiologic study that examined the effects of the epidemic transition of cardiovascular disease on the Carriacou, a small island of Grenada. (Dozier et al., 2008). Dozier et al. (2008) sought to understand the local beliefs and practices that are associated with health risk and behaviors in Carriacou through a qualitative study using ethnographic and interview procedures. For the interview portion of the study, 25 leaders and key community members were asked to express their general ideas regarding health in Carriacou. Results found that the participants were uncertain about the actual health of the island. They did acknowledge certain conditions (hypertension and diabetes) were present; however, these conditions were not seen as related to cardiovascular disease. Participants believed that heredity was most associated with diagnosis of cardiovascular disease risk factors. Awareness of family history was more likely to lead participants to monitor their health symptoms. Women were more likely than men to be health conscious but only sought care if they were unable to work or carry out every day task. Neither were likely to seek out preventative care (Dozier et al., 2008). The findings in Carriacou were comparable to the findings of Lloyd-Sherlock, Beard, Minicuci, Ebrahim, and Chatterji (2014) who conducted the

World Health Organization's Study on Global Aging and Adult Health on more than fifty low-and-middle income countries. The researchers found that women were more likely than men to associate hypertension with overweight/obesity and were also more likely to control their blood pressure after visiting the doctor (Lloyd-Sherlock et al., 2014). These results were also similar to the findings on the island of Petite Martinique (Block et al., 2012). A limitation of the research strategies conducted by Dozier et al. (2008) in Carriacou is that the study excluded lay members of the community, and it did not take into account the preexisting differences among the islands. Therefore, the results could not be generalized to Grenada or Petite Martinique.

Block et al. (2012) project was one of two studies funded by the Grenada Heart Project (GHP). The goal of the GHP was to tap the epidemiological transition of CVD risk factors in Petite Martinique and Carriacou. A population wide community-based approach was designed to interview approximately 2,000 residents from Petite Martinique and Carriacou to assess the prevalence of CVD risk and the influencing factors. Dietary risk for CVD risk factors was found to be the most common and these dietary risk factors were found to be most prevalent among women and adults younger than 55 years (Block et al., 2012). There was an inverse relationship between age and fried food consumption, especially among women, which were similar to the results from another study that only focused on diet quality and the relationship to cardiovascular disease risk factors. The research uncovered that diet quality has inverse association with the number

of CVD risk factors among middle-aged adults in the United States (Nicklas, O'Neil, & Fulgoni, 2012). Block established that women were more likely than men to have a large waist circumference, but the highest obesity rates were reported among both sexes 45-55 years of age (Block et al., 2012).

The second study funded by the Grenada Heart Project was designed to assess the clinical, biological, and psychosocial determinants of CVD and compare the prevalence rates specifically of Grenada, West Indies, and to the findings in the United States. Adults eighteen years and older from St. Georges, Grenada, were randomly recruited. Approximately 2,800 residents participated in the survey. Results showed that compared to the United States National Health and Nutrition Examination Survey (US NHANES) the prevalence of obesity, diabetes, hypertension, and hypercholesterolemia were significantly higher in Grenada. Further, Grenadian women had higher rates of diabetes and hypertension as compared to American women, and Grenadian men had higher rates of diabetes but similar rates of hypertension as compared to American men (Bansilal, 2012). This study established that the prevalence rates of diabetes, hypertension, and obesity in Grenada exceeds that of the United States. The research from the Grenada Heart Project and the World Heart Federation reiterated the increasing problem of cardiovascular disease risk factors in LMIC, more specifically in Grenada, West Indies. Both studies stressed the need to concentrate on preventative care that is contingent on local practice. Understanding local norms, beliefs, and attitudes towards health is a critical step

in engaging the community to design an effective and sustainable intervention (Bansilal, 2012). Block et al. (2012) suggested that future research emphasize the importance of on-going efforts of care and the necessity to tailor programs to the target community. During a meeting with an internal medicine specialist in St. Andrew, Grenada, it was discussed that when it comes to health care, Grenadian women are more likely to see a doctor than Grenadian men. Additionally, Grenadian women are likely to convince their male family members to see a doctor. Which, again, suggested that women are influential members of the house-hold in Grenada (Dr. Yearwood, personal communication, September 2015).

The findings of non-communicable health in Grenada are congruent with the health of the world. Lifestyle management is an important step in the prevention and treatment of hypertension. As Block et al. (2012) found, obesity rates are high among Grenadians, especially those of middle age. Weight loss is a primary goal in combating risk factors for cardiovascular disease, a reduction in weight can reverse the pathophysiological influences of hypertension (Richard, 2009).

Another lifestyle factor that can be controlled is salt intake. Although, there was not data on the intake of sodium in the Grenadian diet, numerous clinical and epidemiological studies have confirmed that reducing salt intake reduces hypertension (Ha, 2014). As well, there are many observational studies that support an association between excess salt intake and cardiovascular disease

(Kotchen, 2013). On the contrary, there are studies that suggest that salt has little or no association with cardiovascular disease, (Stolarz-Skrzypek, 2011), however, these studies are insufficient and have been criticized for not following correct methodological procedures (Kotchen & Frohlic, 2013).

One more behavioral factor that influences hypertension is living a sedentary lifestyle. There has been a vast amount of research on the serious complications of physical inactivity. Physical inactivity is a serious health concern around the world (Lee et al., 2012). There is sufficient evidence that physical inactivity is strongly related to hypertension (Pate et al., 1995). When predicting physical activity on mortality among women, it was found that women who were physically inactive (engaging in physical activity less than one hour per week) had a doubling rated of CVD mortality, hypertension, hypercholesterolemia, and obesity as compared with physically active women (Lee et al., 2012). Today, the Center for Disease Control and Prevention recommends that all adults should avoid physical inactivity. Emphasizing the necessity to partake in any amount of physical activity to gain some health benefits, especially to exercise moderately-intensely for 20 minutes or more a day, to see substantial health benefits. Unfortunately, a majority of the world population at the moment is not achieving these recommendations. It is estimated that if physical inactivity were reduced by 25%, more than 1.3 million deaths could be prevented each year (Lee et al., 2012).

Regular physical activity has been recognized as an important component in maintaining overall health and well-being. Being physically active has been found to be associated with more than a 50% percent reduction in disease (Warburton, Nicol, & Bredin, 2006). Engaging in physical activity is beneficial in both primary and secondary prevention of cardiovascular disease.

Family history of heart disease has an increased magnitude of hypertension with additional behavior risk factors. A cross-sectional study surveying a large cohort of South Asian Adults from Sir Lanka found that hypertension was significantly higher in patients who reported having family history of hypertension than those who did not report a family history (Ranasinghe, 2015). There are specific ethnicities that have a greater threat of seeing family history as a risk for hypertension incidence, African American adults are more likely than Caucasian of Hispanic adults to become diagnosed as hypertensive early on in life and tend to experience more severe levels of hypertension (AHA, 2015).

Several studies have concluded that the prevalence of these risk factors for hypertension, and essentially non-communicable diseases are more extensive in low-and-middle income countries (LMIC) as compared to high income countries (Joshi et al., 2008). In 2005, approximately 80% of non-communicable disease mortality was in these LMIC, with the largest proportion of those that were diagnosed being the younger, working class individuals (Lawes et al., 2008). By 2050, experts predict that more than 80% of all chronic deaths

worldwide will be strictly in LMIC (the current rate today is 60%) (Acosta et al., 2010), and more than half will be under the age of seventy (Abegunde, Mathers, Adam, Ortegon, & Strong, 2007). This prediction amplifies why it is important to focus on reducing health disparities worldwide.

Healthy People defines health equity as attaining the highest level of health for all people (CDC, 2015). Achieving health equity requires ongoing effort. All members of society would need to value everyone equally and to avoid inequalities by eliminating health and health care disparities and focusing on distributive justice to give all populations equal access to health care and education (Jones, 2010). As of current, there are no Global Hearts Initiative programs funded by the WHO in Grenada, West Indies, but the WHO expressed their openness to work with any country wishing to participate (WHO, 2017).

The World Heart Federation and the Grenada Heart Project's findings show that age, sex, socioeconomic status, and geographic location all contribute to the individual's ability to achieve good health or, in this sense, lack thereof; this constitutes as a health disparity for the residents of that community. Healthy People 2020 statistics and goals discuss inequalities in America, but health disparities are grossly abundant throughout the world (Jones, 2010; Marmot, 2007). Health Disparities occur both between countries and within countries. Marmot (2007) found that life expectancy at birth is a prime example of health disparities between and within countries. Marmot, along with other researchers found that in Sierra Leone the average life expectancy is 34 years while Japan's

average life expectancy is 81.9 years. This is the same for within the United

States, Danaei et al., (2011) found that there is a 20-year age difference between

the most advanced and the least advanced populations.

Due to modern medicine and technology, diseases have transitioned from

infectious disease to non-communicable disease (Joshi, Jan, Wu, & MacMahon,

2008). The most prevalent non-communicable disease is cardiovascular disease.

Cardiovascular disease is responsible for 17.5 million deaths annually world-

wide. The number one risk factor for cardiovascular disease is hypertension

(Kearney et al., 2005). Hypertension accounts for 7.5 million deaths world-wide

(12.8% of all deaths total). In some age groups, the risk of cardiovascular

disease doubles each increment of 20/10 mmHg of blood pressure (WHO, 2014).

Chief risk factors for hypertension are modifiable behavior risk factors, unhealthy

diet, smoking, obesity, and physical inactivity. Urbanization- the social, economic,

and environmental transformation of a community- places human health at risk

because the population's demands most often outweigh service and capacity of a

given community (Dozier et al., 2008; Gaziano, Bitton, Anand, Abrahams-Gessel,

& Murphy, 2010). An influx of processed foods and a lack of education pertaining

to these changes increase the risk of hypertension risk factors. One of these risk

factors is dietary behavior, and changes to an unhealthy food lifestyle need to be

made in these communities to better their future health (Remig et al., 2010).

Residents of Grenada, West Indies consume a diet rich in high fat oils and

processed meats (Albert, 2007). It is because of this that Grenadians are suffering from hypertension and heart disease (Marmot, 2007; Bansilal, 2012).

Numerous theories and years of research have concluded that one of the best ways for an individual to make a healthy change is to understand the reasons behind making the change, especially when it comes to dietary knowledge associated with disease. When it comes to food labels, consumers with prior knowledge and understanding of food labels are more likely to use the label information effectively. They can make healthy choices based on the information from the food labels because they can understand what they are reading (Miller & Cassady, 2015). However, Miller and Cassady (2015) point out that there are more studies that focus on understanding nutrition facts labels and relatively few studies that investigate knowledge effects on the uses of the ingredient lists, meaning that most studies define food label use by frequency and not how well the information is being used. The researchers closed their study stating that there needs to be more exploration on how well dietary information is being utilized by individuals. These results are conclusive with earlier researchers from the United Kingdom who combined observation and in-store interview techniques and found that for nutrition labels to have any effect, individuals who read them must first have the nutrition knowledge to understand them (Grunert, Wills, & Fernandez-Celemin, 2010). However, Grunert, Wills and Fernandez-Celemin (2010) also found that there is not always a high degree of healthy food consumption with higher ability to understand nutrition labels,

meaning that an individual is more interested in indulgence than nutrition information. More specifically, when looking at knowledge of excess salt consumption in a South African community, researchers found that when asked about their awareness of recommended salt consumption, most did not know that there was a limit. And, when asked whether salt was good for their health, the majority stated that they knew it was harmful to their health (Mushoriwa et al., 2013). Consumer education and awareness are important in combating unhealthy eating, and in order to make changes, the first step in a community is to explore the understanding of dietary behavior as it is a pre-requisite to making healthy choices.

The goal of this study is to understand ways to reduce the health disparities of non-communicable disease within the Caribbean by using the components of the PEN-3 model to highlight the positive dietary behaviors and health knowledge of the female residents in Grenada, West Indies. As noted, Grenadians have a high incidence of cardiovascular disease risk factors (Bansilal, 2012), and rates of hypertension amid African Americans is among the highest of any population in the world (Central Intelligence Agency, 2014).

Although few efforts have been made, countless more need to be expended to reduce the incidence of non-communicable disease risk factors in Grenada, not only for the health of the individual but also for the community. It is hoped that through this research the World Health Organization recognizes the need for A Global Hearts Initiative Program in Grenada, West Indies. This study

explored the knowledge and understanding of dietary behaviors of the female residents of Grenada to discover the association between diet and hypertension diagnoses. The research questions for the proposed study seek to answer the following questions:

1) When controlling for work status, age, and education level, to what extent do the women living in Grenada, West Indies, associate dietary behaviors with hypertension?

2) And when controlling for work status, age, and education level, what is the relationship between diet and hypertension among women in Grenada, West Indies?

CHAPTER III

METHODOLOGY

Introduction

This study was designed to explore knowledge about the risk of dietary behaviors associated with non-communicable disease among women living in Grenada, West Indies, and examine the extent to which these women associate their dietary behaviors with their blood pressure diagnosis. The researcher met with several professors and key members of the community to discuss the nutrition behaviors of the residents and the burden of non-communicable disease risk factors. It was through these meetings that the researcher decided that this exploration was needed to contribute in fighting non-communicable disease in Grenada. This study measured the understanding of dietary behaviors associated with disease.

Research Questions

The research questions for the proposed study seek to answer the following questions:

1) When controlling for work status, age, and education level, to what extent do the women living in Grenada, West Indies, associate dietary behaviors with hypertension diagnosis?

2) In addition, when controlling for work status, age, and education level, what is the relationship between diet and hypertension diagnosis among women in Grenada, West Indies?

Participants

Institutional Review Board (IRB) approval was accepted from the Middle Tennessee State University review board and St. George's University review board. Middle Tennessee State University approval can be found in Appendix B and St. George's University approval can be found in Appendix C. The Ministry of Health of Grenada was contacted and informed of plans for research, and the Chief Medical Officer and the Medical Secretary permitted the proposed project (G. Mitchell and F. Martin, personal communication, October 30, 2015). The Grenada Food and Nutrition Council was also informed of the intended study and reiterated that the results could be used to help promote better health throughout the island.

The population for the study were women living in Grenada, West Indies who were at risk for hypertension. The specific population was Grenadian women who attend the One Health, One Medicine health fairs that are hosted by St. George's University and health clinics hosted by the Grenada Food and Nutrition Council. The One Health, One Medicine (OHOM) clinics unite human and veterinary medicine around the island. The One Health fairs were chosen as a means of collecting data due to the easy access to the residential population and the diversity of the participants attending these clinics. Dr. Chamarthy Subbarao, Professor of Clinical Skills who oversees OHOM clinic, permitted the study to take place during the health fairs. Therefore, the convenience sample consisted of residents attending the OHOM clinics as well as at health clinics around the island, using the approved questionnaire. The clinics were asked to sign a letter

of agreement, drafted by the researcher to allow for the research data to be collected outside of the agency. The letter of agreement was approved by Middle Tennessee State University and is attached in the Appendix.

Measures

This study was a cross-sectional study design which used a convenience sample of the population of women living in Grenada, West Indies. In order to meet the power and effect size requirements for the study the researcher met with a statistical consultant. The sample size justification was decided by a power analysis by Dr. Paul Fields, who works as a statistician with WINDREF research institute at St. George's University (SGU). Dr. Fields determined that a sample size of 100 or greater was needed to conduct a proper statistical analysis of the data.

Questions on food consumption were developed and edited from the World Health Organization's Summary Report of non-communicable disease risk factors survey in Georgia (Farrinton, 2007). Food consumption questions were then modified using an expert panel influential member of St. George's University and the community. Their opinions and suggestions for the dietary assessment were used to create relevant food recall items with local foods available in Grenada, West Indies. The food consumption portion of the questionnaire was designed for the participants to answer how often they consume a particular food item with potential responses being "1-2 times a week/3-5 times a week/6-8 times a week/8 or more times a week/never", which corresponded respectively with "rarely/sometimes/often/always/never".

The health behavior knowledge assessment was modified from Holdworth et al., (2007) study on Senegalese women's understanding of dietary risk factors associated with disease. These questions of knowledge about health behavior on non-communicable disease risk factors were chosen based on a similar demographic, and had passed criteria for content validity, item discrimination, item difficulty, and internal consistency from previous research. The health behavior knowledge section of the questionnaire consisted of a modified 16 item scale (Holdsworth et al., 2007). The questions assessed the understanding of dietary behaviors that are scientifically associated with heart problems, obesity, and hypertension. An example of the questions that were used for the health behavior knowledge scale was "Eating a lot of fat can cause heart problems" with the potential responses being "yes/no/uncertain". A Likert scale was used to determine the range of health behavior knowledge. All correct responses were "yes" and they were given a score of "1," all incorrect responses were "no" and were given a score of "0." The higher the score, the better the health behavior knowledge associated with hypertension. The PEN-3 cultural model was used to emphasize healthy behaviors of the Grenadian women.

Sampling Procedures

Participants were assisted in filling out a questionnaire that addressed self-reported medical history of non-communicable disease risk factors, understanding of dietary risk associated with these disease risk factors, and food consumption. Weight and height measurements were self-reported

measurements used to calculate Body Mass Index (BMI). The women were asked if they could recall the last time a medical professional checked their blood pressure and if they had been told that they had high blood pressure. Vargas et al. (1997) reported on the reliability of self-reported hypertension on non-Hispanic, black women and found that when blood pressure cannot be measured, it may be utilized, and is more reliable if the woman has been to the doctor with-in the year. In terms of confidentiality, no names of the participants were collected or divulged.

Women were recruited for the pilot testing by the researcher on April 16, 2016, at the One Health, One Medicine Health Clinic in St. Andrew, Grenada. The women were approached by the researcher and the medical student volunteers and asked if they would like to participate in a research study questionnaire. If they agreed to participate, he researcher or medical student volunteer provided the women with an IRB approved verbal consent form, attached in the appendix, and the researcher then walked them through the questionnaire.

The pilot test was conducted by the researcher by reading the questions to the testing participants and observing their reactions. In addition to expert content validity of the questionnaire, the researcher used cognitive interview techniques during the pilot test to ensure the women were able to understand the questions. Questions were read by the researcher so that they were easily understood. If the respondent appeared confused or hesitant to answer they were asked to elaborate on why. A minimum of 30 women were sought for the

pilot testing, however, only 18 surveys were collected on that day. The pilot test also determined the amount of time needed for the survey, approximately 20 minutes per participant, as well as the logistics needed to best collect the data at the One Health, One medicine clinics (e.g. the researcher and volunteers interviewed the women while they were waiting to see the doctor.)

Data were collected at health clinics around Grenada, West Indies in the fall of 2016. Permission to collect data at the at the One Health, One Medicine clinics was given by Dr. Subbarao, access to data collection at the Royal Grenadian Police Force clinic and Spice Island Mall clinics given by Dr. Bidaisee, and access to data collection at the government run health clinics was given by Ms. Lydia Browne at the Grenada Food and Nutrition Council. An agreement form was signed by a staff member at each of the government health clinics prior to collecting data. These agreement forms are found in Appendix E.

Data Entry Management and Data Analysis

Epidata was used for data entry and data management. IBM's predictive analytical software, IBM SPSS Statistics version 23, was used for data analysis. Descriptive statistics and frequency statistics were run to describe the characteristics of the sample. For research question 1, a regression analysis was run to determine the relationship between health behavior knowledge and previous hypertension diagnosis. For research question 2, a chi-square goodness of fit analysis was run to determine the relationship between hypertension and diet. For both test, a significance level of a = 0.05, allowing for a 95% confidence in significance.

Assumptions and Limitations

It was proposed that this study would follow a mixed-methods approach. The proposal intention was to have participants fill out a questionnaire on their dietary habits and the relation of diet to non-communicable disease, analyze the quantitative data, and then follow up with a qualitative interview about the results with the participants. The researcher was not able to conduct the analysis in time to follow up with the qualitative interview. This is a vast limitation to the study, and thus the researcher plans to conduct a follow up qualitative study in the future by interviewing key members of the community regarding thoughts and beliefs about the quantitative results.

A second limitation of the study was selection bias of the sample. Unfortunately, safety on the Island was a concern for the researcher as there were two serious incidents in the fall of 2015. Therefore, for safety reasons, it was best to collect data through the clinics provided by St. George's University and the Grenada Food and Nutrition Council. This did not allow for probability sampling of the population, so the results cannot be generalized to the whole Grenadian population. The results can only be inferred in a population like that of the women who attended the One Health, One Medicine clinics or health clinics around the island, in other words those who seek out health care.

A third limitation of the study was self-reported data. Participants were asked to self-report their measurements, height and weight, as well as recall the last time a medical professional took their blood pressure and whether or not

they were diagnosed as hypertensive. Participants were also asked to recall how often they consume certain types of foods.

The assumption was made that residents who attend the One Health, One Medicine Health Clinics have an array of non-communicable disease risk factors. Further, it was also assumed that residents answered the questionnaire honesty.

This chapter presented the intended population, the participants, the sampling procedures, the measures, the development of the data collection instruments, human protection policies, data entry management and data analysis, and the assumptions and limitations. The statistical analysis used to address the research questions included descriptive t-tests, regression analysis, chi-square test of independence, and logistic regression. The results of these statistical tests are reported in Chapter 4.

CHAPTER IV

RESULTS

Introduction

This chapter provides a descriptive summary of the study participants and the results of the analyses conducted to answer the research questions. One hundred and three (n = 100 with 3 eliminated) females living in Grenada, West Indies participated in the study. All statistical analyses were conducted using IBM's predictive analytical software, IBM SPSS Statistics version 23.

Descriptive Statistics

A total of eighteen (18) women participated in the pilot test. Demographic results from the pilot test are listed in Table 1. The following changes for the demographic section were made from the pilot test; when asking the highest level of education, the term "secondary school" was used instead of "high school," when asking how often blood pressure was checked, "with in the last six months" was added. The women indicated that they visited the doctor often for check-ups.

All the women who participated in the pilot test were from St. Andrews. Women who said that they were currently living with someone, 66.6% (n =12), was twice that of women who reported that they were currently living alone, 33.3% (n = 6). The women's ages ranged from 20 years to 80 years with the mean age of 45 ± 18.3. All the women interviewed had at least some education,

with a majority of the women saying that they had only completed primary school.

Approximately 72% said that they had completed primary education (elementary

schooling),11% said they had completed secondary education (high schooling),

and 17% said that they had completed some form of advanced education. More

than half of the women said that they were currently working, 44.4% (n = 8) said

that they were self-employed and 16.7% (n = 3) said that they were working a

professional job. A little over a quarter of the women were unemployed, 27.8% (n

= 5), and one woman said she was a student and one woman said she was

retired.

When asked if they exercised moderately for twenty minutes or more per

day, four women admitted that they never exercised, one woman said that she

exercised 1-2 times per week, two women said they exercised 3-5 times a week,

and eleven women said that they exercised 6-7 times a week. Eighty-seven

women were able to give height and weight measurements for body mass index

(BMI) calculations. More women were classified as overweight and obese than

normal or underweight, 8.3 % of the women were considered underweight (BMI ≤

18.5), 16.7% were considered normal weight (BMI = 18.6 - 24.9), 41.67% were

considered overweight (BMI = 25 -29.9), and 33.3% were considered obese (BMI

≥ 30). Lastly, when asked about whether they consume alcohol, 38.9% (n = 7)

said that they never drink, while 27.8% (n = 5) said that they drank 1-2 times per

week and 27.8% (n = 5) said they drank occasionally. Only one woman said that

she drank 3 or more times per week.

Table 1

Characteristics of the Pilot Test Sample (n = 18 women)

Characteristic	n	Valid %
Education level		
Completed primary	13	72.20
Completed secondary	2	11.10
Advanced degree	3	16.70
Work status		
Student	1	5.55
Unemployed	5	27.78
Self-employed	8	44.40
Professional	3	16.70
Retired	1	5.60
Living situation		
Living alone	6	33.33
Not living alone	12	66.70
Parish		
St. Andrew	18	100.00
BMI[b]		
Underweight (< 18.5)	1	8.30
Normal (18.6 - 24.9)	2	16.70
Overweight (25.0 - 29.9)	5	41.67
Obese (> 30.0)	4	33.30
Blood Pressure History[a]		
Yes	7	41.20
No	10	58.80
Exercise		
Never	4	22.00
1-2 days/wk	1	5.60
3-5 days/wk	2	11.10
6-7 days/wk	11	61.60

[a]n = 17. [b]n = 12.

A total of 103 women participated in the questionnaire, see Table 2. More than half of the respondents reported living in St. George (62%) and a little over a quarter reported living in St. Andrew (29.1%), the rest of the respondents reported living in St. David (4.9%), St. Patrick (2.9%), and Carriacou (1%). Living status was almost evenly split with 55.3% (n = 57) of the respondents reporting that they were currently living with someone, while 44.7 % (n = 46) reporting that they were currently living alone. The women's ages ranged from 18 years to 84 years with the mean age of 48 ± 16.7. Distribution of age was marginally positively skewed (Skewtosis = 0.088, std. error = 0.29) and platykurtic (Kurtosis = -0.85, std. error = 0.47). All of the women interviewed had at least some education, 56% said that they had completed primary education (elementary schooling), 13% said they had completed secondary education (high schooling), and 29% said that they had completed some form of advanced education (n=102).

When the women were asked if they exercised moderately for twenty minutes or more per day, the answer choices were combined for the final analysis. Forty-seven (47) women said that they exercised 3-7 days per week and 55 women said that they exercised fewer than 2 days a week, one woman did not answer (n =102). Eighty-seven women were able to give height and weight measurements for body mass index (BMI) calculations, 1% was considered underweight (BMI ≤ 18.5), 18.4% were considered normal weight

(BMI = 18.6 - 24.9), 26.2% were considered overweight (BMI = 25 -29.9), and

38.8% were considered obese (BMI ≥ 30).

Table 2

Characteristics of the Sample (n = 103 women)

Characteristic	n	Valid %
Education level [a]		
Completed primary	58	56.90
Completed secondary	14	13.70
Advanced degree	30	29.40
Work status		
Student	12	11.65
Unemployed	27	26.22
Self-employed	28	27.18
Professional	26	25.20
Retired	10	9.70
Living situation		
Living alone	46	44.70
Not living alone	57	55.30
Parish		
St. Andrew	30	29.10
St. David	5	4.90
St. George	64	62.10
St. Patrick	3	2.90
Carriacou	1	1.00
BMI [b]		
Underweight (< 18.5)	1	1.10
Normal (18.6 - 24.9)	19	21.80
Overweight (25.0 - 29.9)	27	31.00
Obese (> 30.0)	40	46.10
Blood Pressure History [a]		
Yes	48	47.10
No	54	52.90

[a]n = 102. [b]n = 87.

The survey question that was used for blood pressure diagnosis was "Have you ever been told by a health professional that you have high blood pressure." The women answered "yes" if they were previously told that they had high blood pressure, giving them the blood pressure diagnosis of hypertensive, and "no" if they had never been told that they had high blood pressure, giving them the blood pressure diagnosis of not hypertensive. Therefore, a yes means they are currently or have been hypertensive and a no means they have not ever been diagnosed as having hypertension. For the pilot test, seven women (41.2%) said that they had been diagnosed as hypertensive and 10 women (58.8%) said that they had not ever been diagnosed as hypertensive.

For the final sample, a total of 80 women (77.6 %) who were interviewed acknowledged that they had previously had their blood pressure checked within the last year. Thirteen (12.6 %) women had their blood pressure previously checked within the last two to five years and 5 (4.9 %) had theirs previously checked more than 5 years ago. Two women (aged 29 and 22 years old) indicated that this was the first time they had their blood pressure checked, and three women did not answer the question. A little less than half of the women had been previously diagnosed as hypertensive by a health professional, 47 % (n = 48), the rest had not ever been told by a health professional that they were hypertensive, 53 % (n = 54).

When comparing the means for the two groups of hypertension condition, hypertensive versus not hypertensive, women who were diagnosed as

hypertensive had a mean age of 56 with a standard deviation of ± 13.24. Ages of

the hypertensive women ranged from 20 to 84. Women who had never been

diagnosed as hypertensive had a mean age of 39.08 with a standard deviation of

± 14.83. The ages of these women raged from 18 to 75. Women who were

diagnosed as hypertensive also had a greater mean Body Mass Index (BMI)

score than those who did not have hypertension, with a mean of 31.60 years with

a standard deviation of ± 6.63 and 28.96 years with a standard deviation of ±

6.81. The minimum BMI score for hypertensive women was 19.2 and the

maximum was 53.52, while the minimum BMI score for women who were not

hypertensive was 14.35 and the maximum was 48.43.

Health Behavior Knowledge

Dietary related risk factors associated with non-communicable disease

were associated using a Likert scale. Figure 3 presents a histogram of the pilot

test results from the health behavior knowledge scores (n = 18).
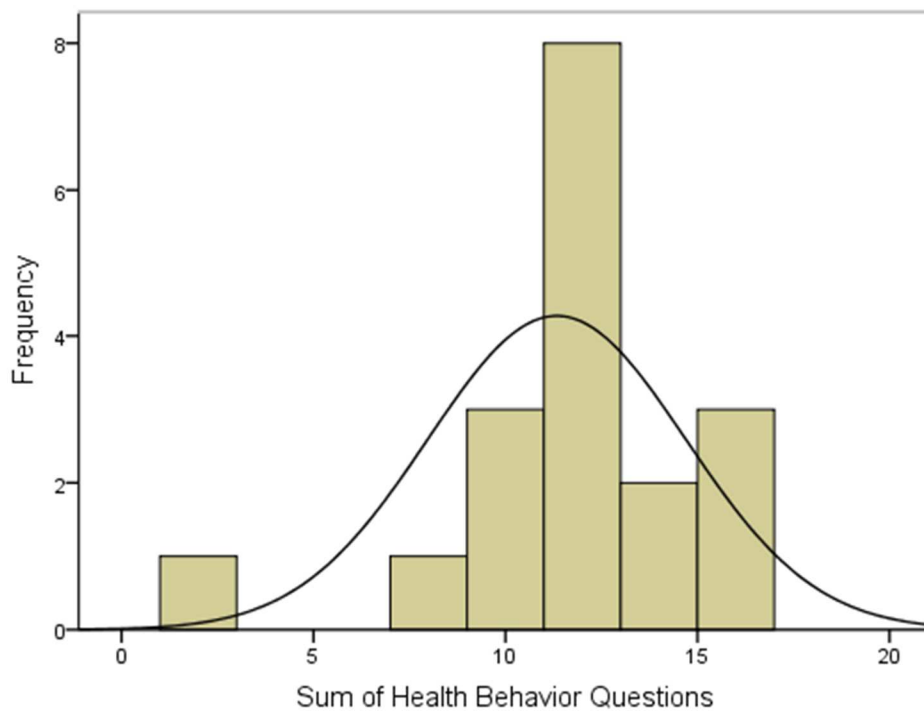
Figure 3. Histogram of Pilot Test Health Behavior Knowledge Total Scores. n = 18.

The mean score for the pilot test was 11.33 with a standard deviation of ± 3.36. The lowest health behavior knowledge score for the pilot test was a score of 2, n = 1, and the highest score was a score of 16, n = 3.

Figure 4 presents a histogram of the sample results from the health behavior knowledge scores. Three of the participants' surveys were removed by the researcher as they did not fill out this health behavior knowledge portion, which left 100 surveys to be used for the analysis (n = 100).
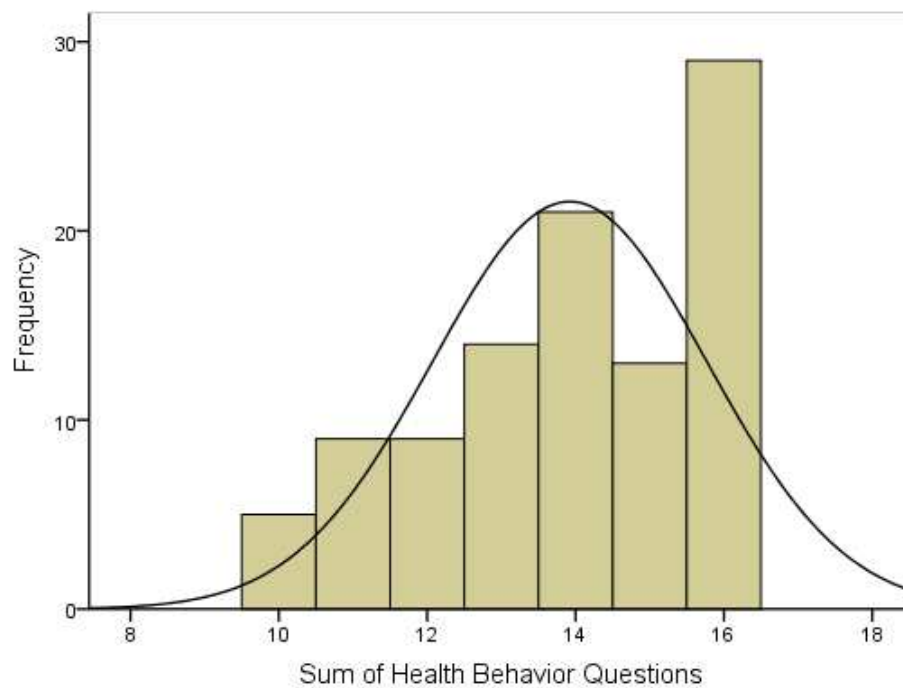
Figure 4. Histogram of Sample Population Health Behavior Knowledge Total Test Scores. n = 100.

The sample participant scores weigh heavily to the right. The distribution was negatively skewed (Skewtosis = -5.24, std. error = 0.24), indicative of higher scores, and with Kurtosis scores roughly approximately 0 (Kurtosis = -0.78, std. error = 0.49). The highest score possible was an 18 and the lowest score was a 0, the maximum score of the participants was 16 and the lowest score was a 10. The mean score was 13.92 with a standard deviation of ± 1.90. Table 3 shows the breakdown of the Health Behavior Knowledge score.

Table 3

*Distribution of Health Behavior
Knowledge
Scores*

Score	n	%
10	5	5.00
11	9	9.00
12	9	9.00
13	14	14.00
14	21	21.00
15	13	13.00
16	29	29.00

Note. N = 100.

It was found that women, who participated in the survey, were knowledgeable about diet related risk factors of hypertension. Twenty-nine (29) women received a score of 16 (89% correct), which indicated that more than a quarter of the participants were very familiar with these risk factors. A total of seventy-seven (77) women received a score of 72% or greater and only 23 women scored lower than 67%.

When comparing the means for the two groups of hypertension condition, hypertensive versus not hypertensive, women who were diagnosed as hypertensive had a mean health behavior knowledge score of 14.20 with a standard deviation of ± 1.81. Women who were not hypertensive had a mean score of 13.70 with a standard deviation of ± 1.89.

Food Consumption

A food recall scale was utilized to gather the quantity of food items associated with heart disease risk factors that were eaten per week by Grenadian women. An expert panel was consulted when identifying popular foods consumed by Grenadians, and a pilot test led to more precise answer choices. The foods that were picked for the analysis were foods that were most commonly associated with risk factors of non-communicable disease. Food consumption was measured using a Likert scale, never, rarely (1 to 2 times a week), sometimes (3 to 5 times a week), often (6 to 8 times a week), and always (8 or more times a week).
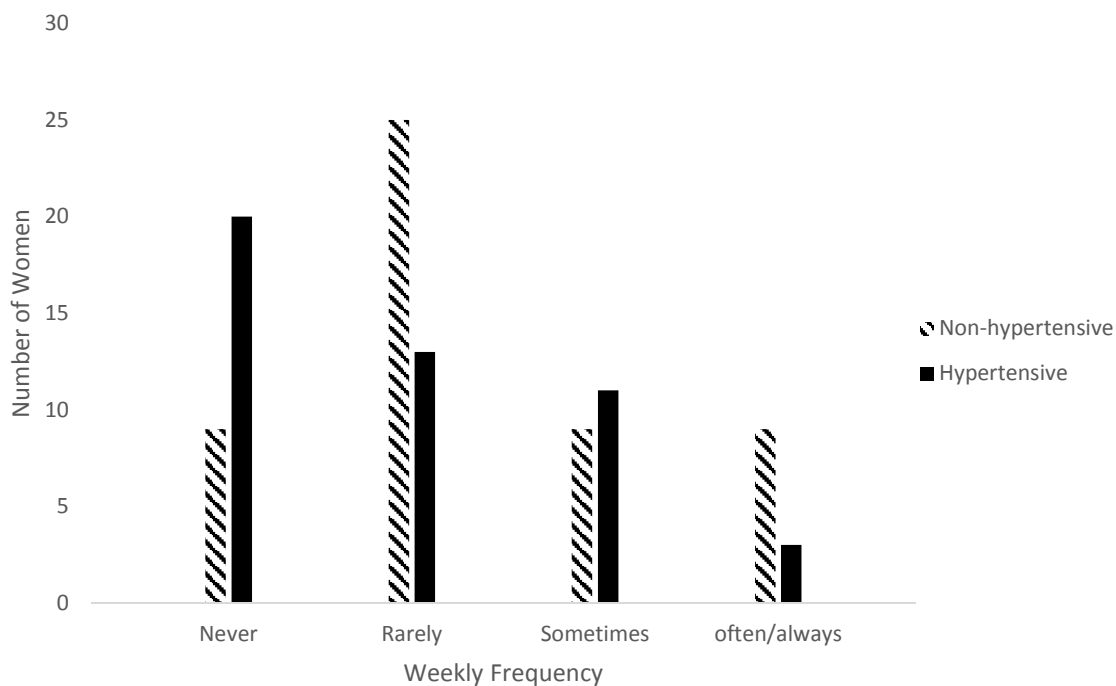
Figure 5. Amount of Sweets Consumed by Non-hypertensive and Hypertensive Women.
n = 99.

Figure 5, illustrates the women's weekly intake of sweets. Sweets are not as preferred in Grenada as they are in the United States. A majority of the women who had been previously diagnosed as hypertensive (42.6 %) said that they never ate sweets, and a majority of the women who had never been diagnosed as hypertensive (48.1 %) said that they rarely ate sweets. In both of the groups, hypertensive and non-hypertensive, only a few women said that they sometimes or always ate sweets, 6.4 % and 17.3%, respectively.
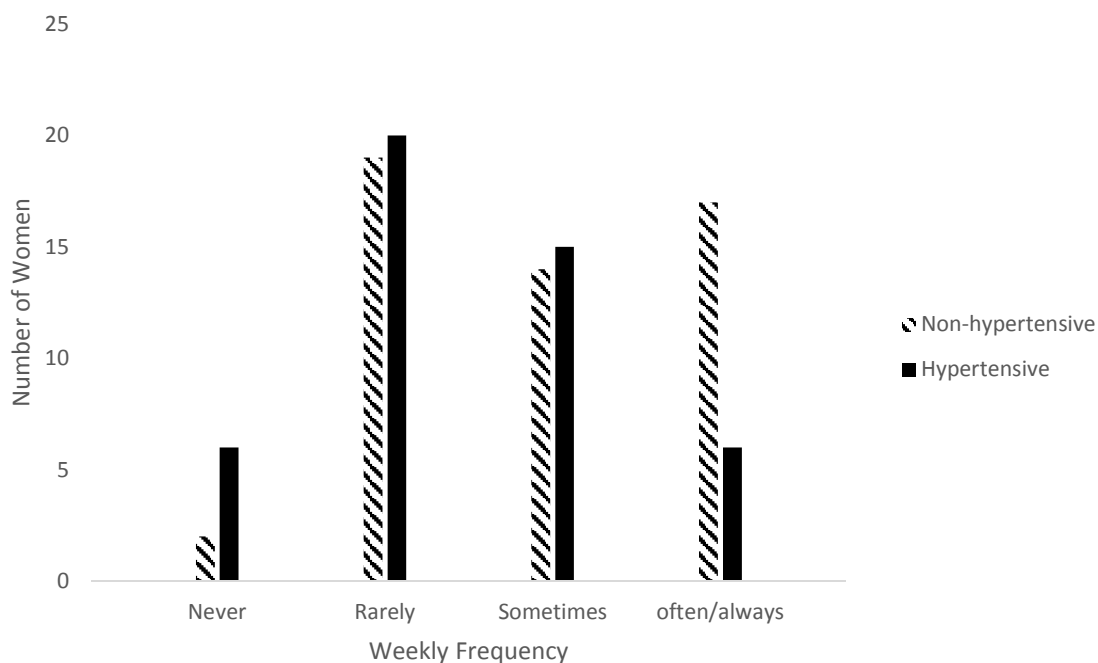
Figure 6. Amount of Cereal Consumed by Non-hypertensive and Hypertensive Women. n = 99.

Figure 6 illustrates how often per week women ate cereal. Cereal was specified as cornflakes or porridge, as that is what is most often eaten for breakfast. More women who have never been diagnosed as hypertensive said that always ate cereal (32.7 %) as compared to women who had been diagnosed as hypertensive (12.8 %). While, the percentages of women who rarely and sometimes ate cereal were about the same for both groups.
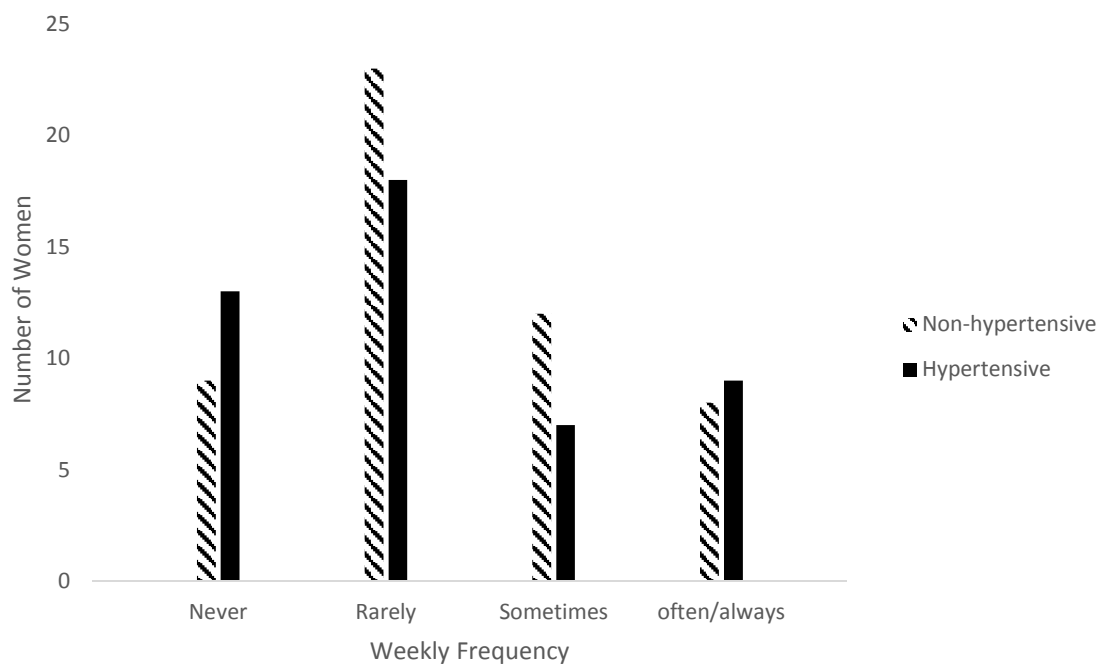
Figure 7. Amount of Red Meat Consumed by Non-hypertensive and Hypertensive Women. n = 99.

Figure 7, illustrates women's weekly intake of red meat. Red meat also is not a dietary staple in Grenada. A majority of both groups of women (44.2 % of non-hypertensive and 38.3% of hypertensive) said that they rarely ate red meat.
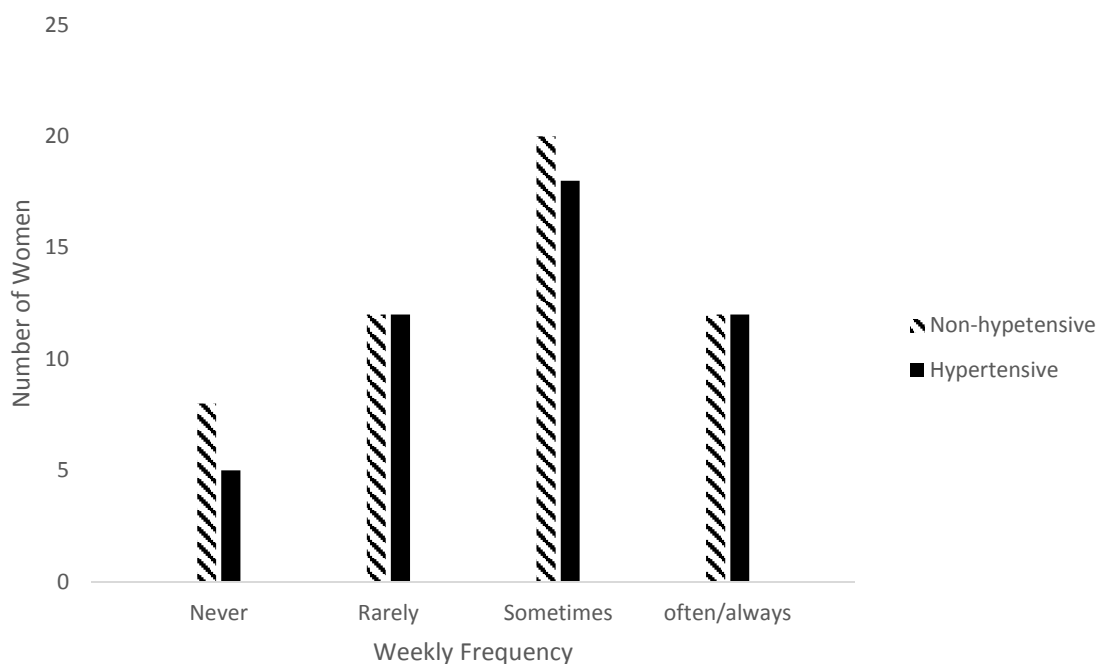
Figure 8. Amount of Salt Fish Consumed by Non-hypertensive and Hypertensive Women. n = 99.

Figure 8, illustrates women's weekly intake of salt fish. Salt Fish, preserved fish through salting and drying, is a Grenadian staple. Both groups of women consume this dish frequently throughout the week. The majority of both groups of women indicated that they ate the dish three to five times a week.

Figure 9. Amount of Stew Consumed by Non-hypertensive and Hypertensive Women.
n = 98.

Figure 9, illustrates women's weekly intake of stew. Stew is a standard

meal for Grenadians. Their most popular meal, Oil Down, is a stew. This dish is

most often made during holidays or special occasions, but a majority of both

groups of women indicated that they have stew three to five times a week, 42.3%

for non-hypertensive women and 45.7% for hypertensive women.
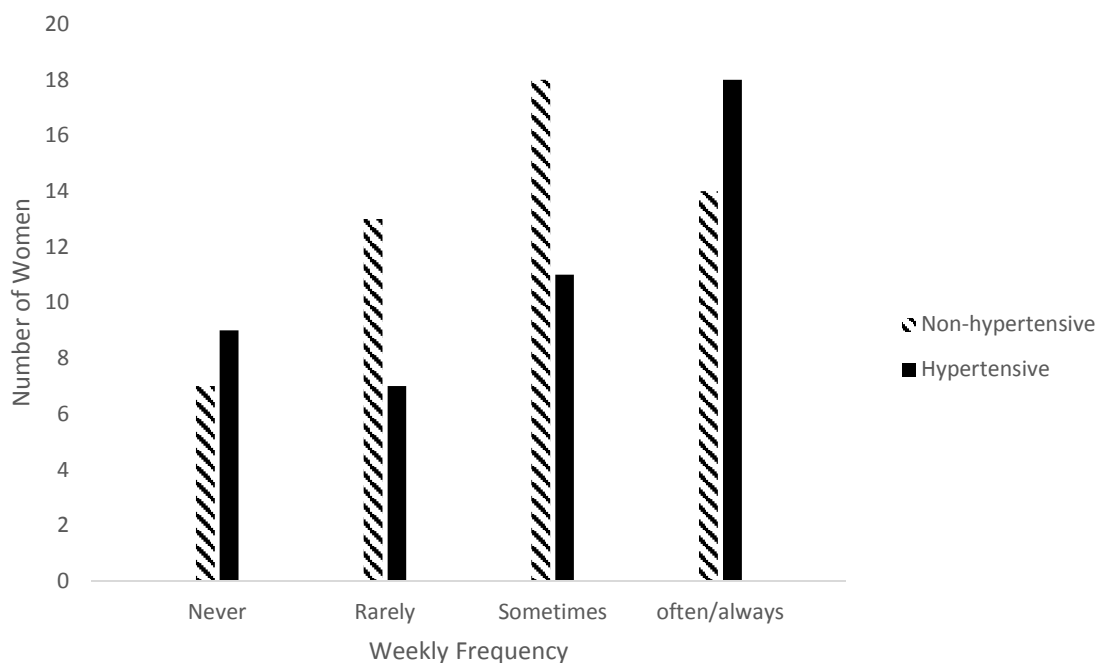
Figure 10. Amount of Packaged Food Consumed by Non-hypertensive and Hypertensive Women. n = 97.

Figure 10, illustrates the women's weekly intake of packaged food. The weekly intake of packaged food increased for women who had been diagnosed as hypertensive, as 40% said that they always ate packaged foods. Most of the women who have not been diagnosed as hypertensive said that they only sometimes ate packaged foods, 34.6%.
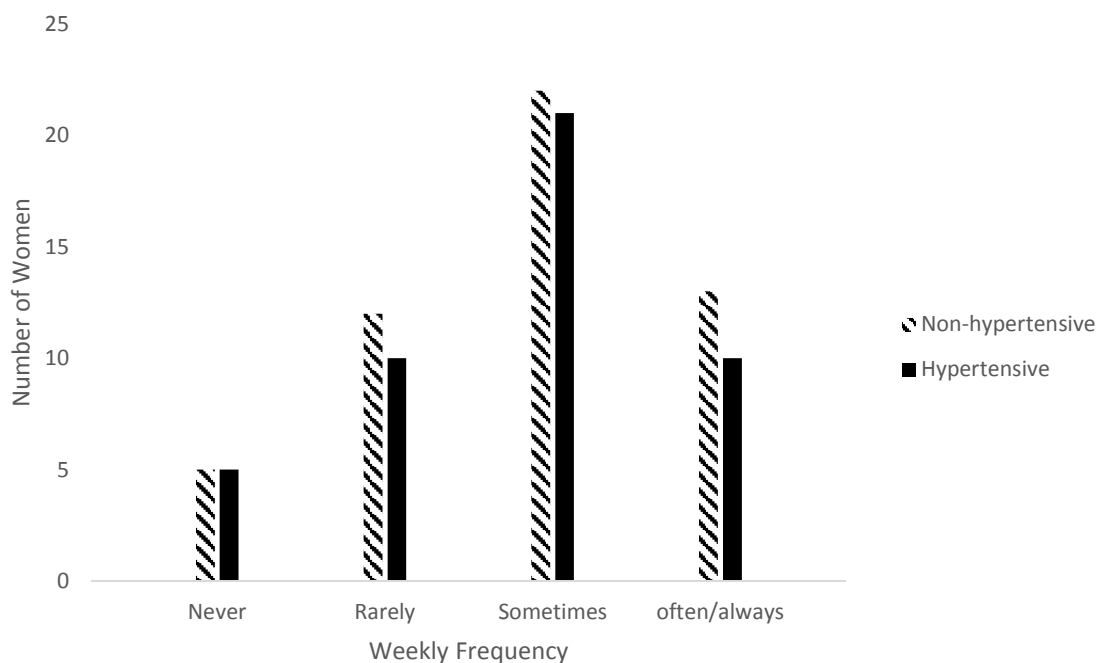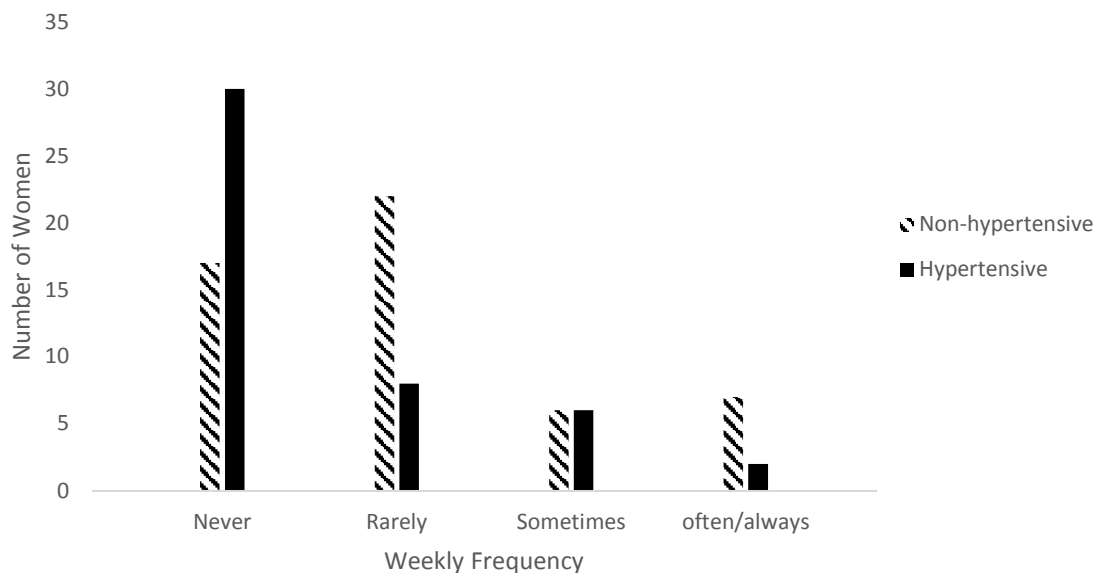
Figure 11. Amount of Seafood Consumed by Non-hypertensive and Hypertensive Women. n = 99.

Figure 11, illustrates women's weekly intake of seafood. Seafood was identified as food other than salted fish (i.e. lambie, lobster, and crab, etc.) As shown, seafood is not often consumed among women in Grenada. A majority of the women who are hypertensive, 65.2 %, said that they never ate seafood, and only 4.3 % said that they always ate seafood. And, a majority of non-hypertensive women said that they rarely, 17.4%, or never, 42.6 %, ate seafood.
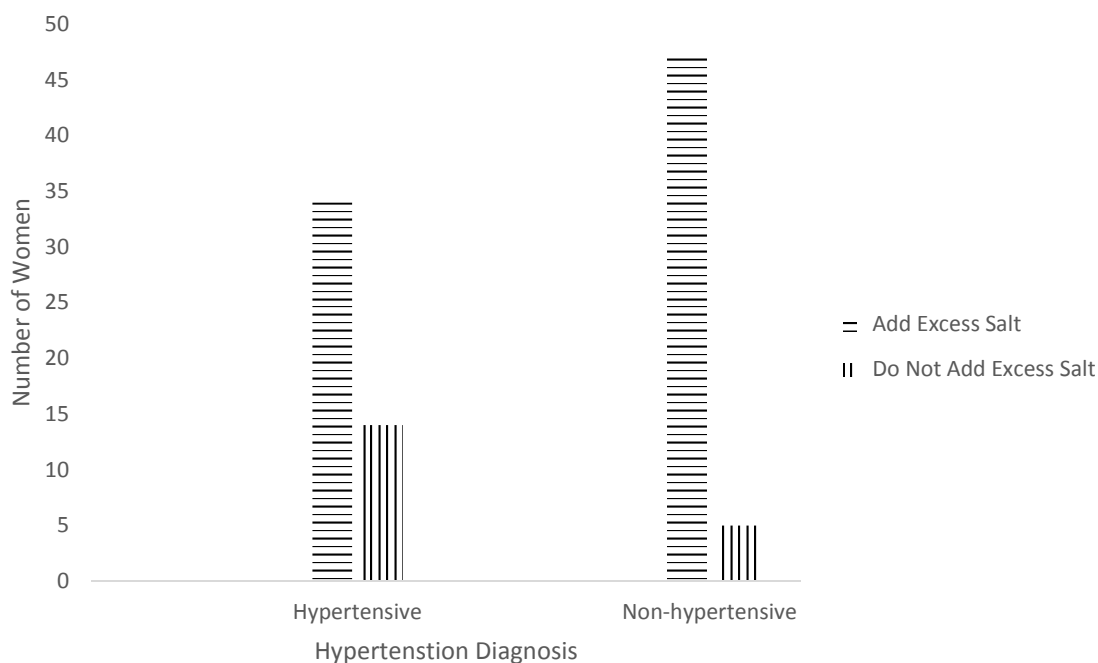
Figure 12. Comparison of Women Who Add Excess Salt to Their Meals Based on Hypertension Diagnosis. n = 100.

Lastly, figure 12 shows the comparison of the amount of salt that women who have been diagnosed as hypertensive and those who have not add to their meals. Most of both groups of women add excess salt to their meals. Of the women who have never been diagnosed as hypertensive, 90.4 % add excess salt to their meals, and of the women who have been told they are hypertensive, 70.8 % add excess salt to their meals.

Research Question One

When controlling for work status, age, and education level, to what extent do the women living in Grenada, West Indies, associate dietary behaviors with hypertension diagnosis? Research question one aimed to explore the correlation

between dietary behavior knowledge and hypertension condition. Hypertension

diagnosis was used as the dependent variable and the independent variable was

the total health behavior knowledge score. Regression and logistic regression

was used to explore the relationship between blood pressure diagnosis and

health behavior knowledge

Table 4 displays the findings from a regression analysis. As mentioned

above, three of the participants were removed from the final analysis and one

participant was omitted as she did not answer whether or not she had been

previously diagnosed by a health professional as hypertensive.

Table 4

Regression Analysis of Hypertension Diagnosis as A Predictor of
Self-Reported Health Behavior Knowledge (n = 99)

Variable	Self-Reported Health Behavior Knowledge					
	B	SE (B)	β	t	p	95% CI
BP History	-0.50	0.37	-0.13	-1.33	0.19	[-1.23, 0.24]

Note. BP = blood pressure. CI = confidence interval.

$R^2 = 0.02$

It was found that the regression model was not a better predictor of health

behavior knowledge as compared to using the mean values of the total health

behavior knowledge score (F (1,97) = 1.78; p =0.19), and so, the regression

model did not predict health behavior suitably (β = -0.13, p = -0.19). There was not a significant association between the health behavior knowledge total score and blood pressure diagnosis (t (1,97) = -1.33; p = 0.19). The coefficient of determination (R^2 = 0.02) provided the measure of how much the variability in the health behavior knowledge was accounted for by blood pressure condition, meaning that blood pressure diagnosis accounts for 2% of health behavior knowledge.

Further, a logistic regression analysis was then used to test the predictive power of the main independent variables (health behavior knowledge, age, education level, body mass index, work status, and living status) and the significant interactions on hypertension diagnosis (n = 84). The initial analysis of the logistic regression model was a good fit. The model correctly predicted 56% of the participants as not having high blood pressure. The log-likelihood model summary statistic found there to be a significant change between model 1 and 2, (x^2 = 50.26, p < .01). Therefore, when the independent variables are included in the model, the model becomes a better predictor of whether someone gets diagnosed with having hypertension than when only the constant was included.

Table 5 displays the odds ratios for the main independent variables and interaction effects on hypertension condition.

Table 5

Summary of Logistic Regression Analysis for Variables Prediciting Hypertension Diagnosis

Variable	B	SE B	Wald x^2	df	*p*	Exp. B
Main Effects						
Constant	-8.66	3.76	5.26	1.00	<0.05	0.00
Health Behavior Knowledge Total	0.00	0.22	0.00	1.00	0.99	1.00
Age	0.21	0.05	17.02	1.00	<0.01	1.23
BMI						
Obese	(ref)		9.82	2.00	<0.01	
Normal	-4.25	1.36	9.79	1.00	<0.01	0.01
Overweight	-0.78	0.73	1.14	1.00	0.29	0.46
Education:						
Advanced	(ref)		3.80	2.00	0.16	
Primary	-0.18	0.92	0.45	1.00	0.56	0.16
Secondary	-0.89	1.16	0.59	1.00	0.44	0.41
Work status:						
Retired	(ref)		4.97	4.00	0.29	3.61
Student	1.28	1.92	0.45	1.00	0.50	11.06
Unemplyed	2.40	1.62	2.21	1.00	0.14	1.87
Selfemplyed	0.63	1.81	0.12	1.00	0.73	2.65
Professional	0.97	1.85	0.28	1.00	0.60	0.32
Living, not living alone is ref	-1.14	0.80	2.01	1.00	0.16	0.32
Interactions						
Constant	-69.35	38.90	3.18	1.00	0.08	0.00
BMI x HBK Total			1.63	2.00	0.44	
Age x HBK Total	-0.09	0.06	2.54	1.00	0.11	0.91
Age x BMI			1.71	2.00	0.42	
Age x BMI x HBK Total			1.74	2.00	0.42	

Note. N = 84. Nagelkerke R^2 for Main Effects = 0.60. -2Log likelihood = 64.93. Main Effects Model x^2 = 50.26.

Nagelkerke R2 for Interaction Model = 0.65. -2Log likelihood = 59.11. Interaction Model x2 = 56.14.

Nagelkerke R2 for Significant Main effects = 0.65. -2Log likelihood = 59.11. Significant Main Effects Model x2 = 56.14.

BMI - Body Mass Index. HBK = Health Behavior Knowledge. Ref = reference category.

Age and body mass index were the only two variables that were found to be significant. Age was a significant predictor of having hypertension, Wald x^2 (1) = 17.02, p < 0.001, and normal body mass index was a better predictor of having no hypertension, Wald x^2 (2) = 9.82, p < 0.05. Age, body mass index, and health behavior knowledge were then run as interactions to compare the overall fit of the interactions model to the main effects model. The interaction model was found to be a significant fit of the data because the model chi-square was significant, x^2 = 56.114, df = 18, p < 0.001. The improvement from Model 1, the main effects model, to Model 2, the interaction model, did not show a significant change, x^2 = 5.88, p = 0.55. Concluding that, adding the interaction terms to the model had no effect.

The significant main effects, age, body mass index, and health behavior knowledge total were then analyzed in a model to determine the fit of the model. It was found that the model is a significant fit of the data, because the model x^2 = 56.11, df = 18, p < 0.001. However, the improvement from Model 1, the main effects model, to Model 3, the significant effects model, was not significant, x^2 = 5.85, p = 0.55. Therefore, Model 1 is the best predictor of the data.

The interactions model and the significant main effects model were not significant predictors of the data. Meaning, the odds ratio can be concluded from the data using Model 1 as the predictor. The odds ratio indicates that as body mass index changes from normal to obese, the change in the odds of being hypertensive as compared to non-hypertensive is 0.014. Thus, the odds of a

woman who is of normal body mass index being diagnosed as hypertensive is less than that of a woman who is obese. And, as age increases the odds of a woman being diagnosed with high blood pressure is 1.23 times more likely.

Research Question Two

When controlling for work status, age, and education level, to what is the relationship between diet and hypertension diagnosis among women in Grenada, West Indies? Research question 2 aimed to explore the relationship between diet and Blood Pressure Diagnosis among women in Grenada, West Indies. Foods associated with heart disease were chosen as the independent variable. The specific dietary factors that were explored were adding excess salt to meals, consuming red meat, eating cereal or other pre-packaged foods, eating salt fish (a local Grenadian cuisine), eating stewed foods (which typically are made with an abundance of salt), consuming high-fat seafood (i.e. lambie- local conch, lobster, and crab), and eating excess sweets. Hypertension diagnosis was the dependent variable. A chi-squared test of independence was executed for the analysis. All the independent variables met the chi-square assumption of independence. If a variable had an expected value of less than five then it was excluded from the final analysis.

Table 6 displays the results of the chi-square analysis and the descriptive statistics of the main effect variable, adding excess salt to meals, and hypertension diagnosis.

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Table 6

Results of Chi-square Test and Descriptive Statistics for
Adding Salt to Meals by Hypertension Diagnosis

	Add Salt to Meals	
High Blood Pressure	Yes	No
Yes	34 (70.83%)	14 (29.17%)
No	47 (90.38%)	5 (9.62%)

Note. Numbers in parentheses indicate row percentages.

$X^2 = 6.20^*$, df = 1.

* p <0.05.

Of those who have been diagnosed with hypertension, 29.17% do not add extra salt to their meals and 70.83% do add a surplus of salt to their meals. Of those who have not been diagnosed with hypertension, 9.62% do not add extra salt to their meals, and 90.38% do add additional salt to their meals. A higher percentage of both groups of women add excess salt to their meals. There was a significant association between the type of hypertension condition and whether women would add excess salt to their meals (x^2 (1) = 6.20, p < 0.01). Based on the odds ratio, the odds of women adding excess salt to their meals were 3.87 times higher if women were not previously diagnosed as hypertensive than if they were previously diagnosed as hypertensive.

Table 7 displays the results of the chi-square analysis and descriptive statistics of the secondary dietary factors on hypertension diagnosis.

Table 7

Results of Chi-square Test and Descriptive Statistics for Food Consumption by Hypertension Diagnosis

Variable	High BP	Rarely	Sometimes	often/always	Never	X^2 df = 3	p
Cereal[a]						7.09[d]	0.07
	Yes	20 (42.55)	15 (31.91)	6 (12.77)	6 (12.77)		
	No	19 (36.54)	14 (26.92)	17 (32.69)	2 (3.85)		
Red meat[a]						2.47	0.48
	Yes	18 (38.30)	7 (14.89)	9 (19.15)	13 (27.66)		
	No	23 (44.23)	12 (23.6)	8 (15.38)	9 (17.31)		
Salt fish[a]						5.46	0.91
	Yes	12 (25.53)	18 (38.30)	12 (25.53)	5 (10.64)		
	No	12 (23.08)	20 (38.46)	12 (23.08)	8 (15.38)		
Stew[b]						0.23[e]	0.97
	Yes	10 (21.74)	21 (45.65)	10 (21.74)	5 (10.87)		
	No	12 (23.07)	22 (42.31)	13 (25.00)	5 (9.62)		
Packaged[c]						3.75	0.29
	Yes	7 (15.56)	11 (24.44)	18 (40.00)	9 (20.00)		
	No	13 (25.00)	18 (34.61)	14 (26.92)	7 (13.47)		
Seafood[b]						12.59*[f]	0.01
	Yes	8 (17.39)	6 (13.04)	2 (4.35)	30 (65.22)		
	No	22 (42.31)	6 (11.54)	7 (13.46)	17 (32.69)		
Sweets[a]						10.94*	0.01
	Yes	13 (27.66)	11 (23.41)	3 (6.38)	20 (42.65)		
	No	25 (48.07)	9 (17.31)	9 (17.31)	9 (17.31)		

Note. Numbers in parentheses indicate row percentages. BP= Blood pressure. Rarely =fewer than 2 days per week, Sometimes = 3 to 5 days perweek, Often/always = 6 or more days per week, Never = zero days per week.
[a]n = 99. [b]n = 98. [c]n = 97. [d]X^2, 2 cells have an expected count less than 5, minimum expected count is 3.8.
[e]x^2, 1 cell has expected cell count less than 5, minimum expected count is 4.69. [f]x^2, 1 cell has an expected count less than 5, expected count is 4.22.
*p = 0.01.

Of the secondary dietary factors that were analyzed, eating seafood other

than fish and eating sweets were found to have a significant association with

hypertension diagnosis. There was a significant association between eating seafood and hypertension diagnosis among these women (x^2 (3) = 12.59, p = 0.01). However, eating seafood other than fish had an expected cell count of less than 5, violating the Chi-square assumption of expectant frequencies greater than 5.

There was a significant association between eating sweets and hypertension diagnosis among these women (x^2 (3) = 10.94, p = 0.01). A total of 99 surveys were used for the analysis. It was determined that of those who have been diagnosed as hypertensive, 42.6% (n = 20) never eat sweets, 27.7% (n = 13) rarely eat sweets, 23.4% (n = 11) sometimes eat sweets, and 6.4% (n = 3) always eat sweets. Of those who have never been diagnosed as hypertensive, 17.3% (n = 9) never eat sweets, 48.1% (n = 25) rarely eat sweets, 17.3% (n = 9) sometimes eat sweets, and 17.3% (n = 9) always eat sweets.

Logistic Regression was then used to determine the odds ratio for hypertension diagnosis and eating sweets. The consumption of sweets was measured using a Likert scale and coded for the analysis as follows, 0 = never, 1 = rarely, 2 = sometimes, and 3 = often, with 0/never being the comparison. There was a significant correlation between women who rarely ate sweets and those who never ate sweets, b = -1.45, Wald x^2 (1) = 7.59, p < 0.05. It was found that as one changes from never eating sweets to rarely eating sweets, the change in the odds of being diagnosed as hypertensive compared to not being diagnosed as hypertensive is 0.23. Thus, the odds of a woman rarely eating sweets being

diagnosed as hypertensive is 4.27 times more likely than a woman who never eats sweets. There was also a significant correlation between women who often ate sweets and those who never ate sweets, b = -1.90, Wald x^2 (1) = 5.943, p = 0.02. It was found that as sweet consumption changes from never eating sweets to often or always eating sweets the change in odds of being diagnosed as hypertensive as compared to not being diagnosed as hypertensive are 0.16. Accordingly, the odds of a woman often or always eating sweets being diagnosed as hypertensive is 6.32 times more likely than a woman who never eats sweets.

Exercise and Hypertension

Lastly, a Chi-square analysis was run to determine the association between exercise and hypertension diagnosis of the women. Table 8 presents the results of the Chi-square analysis and descriptive statistics for amount of exercise per week and hypertension diagnosis.

Table 8

Results of Chi-square Test and Descriptive Statistics for Exercising 20 Minutes by Hypertension Diagnosis

	Hypertensive	
Exercise	Yes	No
Never	9 (18.75)	9 (16.98)
1 to 2	7 (14.58)	23 (43.40)
3 to 5	14 (29.17)	14 (26.42)
6 to 7	13 (27.08)	5 (9.43)
Monthly	5 (10.42)	2 (3.77)

Note. Numbers in parentheses indicate column percentages.

$X^2 = 13.16^*$, df = 4.

* $p < 0.01$.

It was found that there was a significant association between exercise and blood pressure (x^2 (4) = 13.16, p = 0.01). A total of 101 surveys were used for the analysis and it was found that of the women who had been diagnosed as hypertensive, 18.75% (n = 9) never exercised, 10.42% (n = 5) got 20 minutes or more of exercise less than a few times a month, 14.58% (n = 7) exercised for 20 minutes or more 1-2 times a week, 29.17% (n = 14) exercised for 20 minutes or more 3-5 times a week, and 27.08% (n =13) exercised for 20 minutes or more 6-7 times a week. Of the women who had never been diagnosed as hypertensive, 18.75% (n = 9) never exercised, 3.77% (n = 2) got 20 minutes or more of

exercise less than a few times a month, 43.40% (n = 23) exercised for 20 minutes or more 1-2 times a week, 26.42% (n = 14) exercised for 20 minutes or more 3-5 times a week, and 9.43% (n =5) exercised for 20 minutes or more 6-7 times a week. Regrettably, the assumption of expected frequencies greater than five was violated because one cell had an expected cell count of less than five. Therefore, the interpretation that exercise has an association with blood pressure can only be inferred to the participants within the study.

The analyses to address the two research questions of this study yielded four key findings. First, the focal outcome was found to be that there was no significant association between dietary behavior knowledge and hypertension diagnosis. However, it was determined that women were knowledgeable about diet related risk factors of hypertension. Second, being obese is a significant predictor of being diagnosed with high blood pressure. Specifically, women who are normal weight are less likely be disposed with high blood pressure. Third, age is a significant predictor of high blood pressure, as age increases the likelihood of developing high blood pressure increases. Third, when it comes to dietary habits, adding excess salt to meals and eating sweets have a significant effect on hypertension diagnosis. Women who have high blood pressure are inclined to add excess salt to their meals as are women who do not have high blood pressure. Women who eat sweets are more likely to have high blood pressure than women who choose to never eat sweets.

CHAPTER V

DISCUSSION

In this final chapter the results from the study are synthesized and discussed and implications for further and future research on diet and hypertension among women in Grenada, West Indies are recommended. Hypertension is the leading risk factor of mortality for cardiovascular disease, which is the leading cause of death worldwide (Beaglehole & Yach, 2003). While there are a variety successful interventions to reduce the incidence of hypertension in high-income countries, there are minimal interventions in low and middle-income countries. Urbanization and lifestyle choices are a primary fault for this, as they have led to the rise of non-communicable disease in these low and middle-income countries (Joshi, Jan, Wu, & MacMahon, 2008). Nutritional habits are a major lifestyle choice that has deteriorated over the years, diets that are high in fat and sodium contribute to a rise in non-communicable disease risk factors, especially so in developing countries (Popkin, 2006).

Thus, the purpose of this research study was to evaluate the knowledge and understanding of dietary risk factors associated with hypertension among women in Grenada, West Indies. While there are a variety of theories aimed and reducing health disparities and several intervention strategies to combat non-communicable disease, there is still more that can be done to reach the World Health Organization's goal for 2025 of reducing disease mortality in low and middle-income countries. The aim of this cross-sectional study was to

understand beliefs and behaviors surround non-communicable disease in Grenada.

Dietary Behavior Knowledge and Hypertension

The first research question was, when controlling for work status, age, and education level to what extent do the women living in Grenada, West Indies, associate their dietary behaviors with the risk of hypertension?

A regression analysis was used to determine the magnitude that dietary behavior knowledge had on the blood pressure diagnosis of women living in Grenada, West Indies. It was concluded that there was no significant association between dietary behavior knowledge and hypertension diagnosis among Grenadian women. However, the results indicated that women were somewhat knowledgeable about diet related risk factors of hypertension. This result was determined using a Health Behavior Knowledge of Non-Communicable Disease scale, which showed 77% of the participants received a health behavior score of 13 (72%) or more, and 29% of group received a score of 16 (89%). These findings were differing from what previous research in Carriacou concluded when twenty-five key members of the community were asked to describe their views of the local populations' beliefs and understandings regarding health risks and behaviors associated with non-communicable disease. These key members believed that there was a general uncertainty about one's health and there was a lack of understanding regarding the linkage between hypertension and value of dietary modification (Dozer et al., 2008; Block et al., 2012). The results from this

study found that a majority of the women interviewed were aware of the dietary risk factors associated with hypertension. Nonetheless, women were still hypertensive. Despite this knowledge of non-communicable disease risk factors, a little less than half (48%) of the women reported being previously diagnosed as hypertensive. Therefore, it can be concluded from this research that the women who participated in this study are aware of the risk factors associated with disease, but are not taking measures to lower the prevalence of cardiovascular disease risk factors.

When analyzing other risk factors associated with hypertension this study found obesity to be a significant predictor of high blood pressure among women in Grenada. It was concluded that a woman who was considered normal weight was far less likely to be diagnosed with high blood pressure than a woman who was considered over weight. Not only was obesity found to be a predictor of hypertension, but approximately thirty-eight of the participants surveyed were obese, having a body mass index greater than 30, indicating women in this study are not taking measures to prevent cardiovascular disease risk factors, as obesity is still a serious epidemic among women in Grenada. As previous studies have concluded, excess weight is likely to cause increased arterial pressure resulting in an increased heart rate, which over time can lead to hypertension (Meneton et al., 2005), Thus, weight loss among Grenadian women is another primary goal in the reduction of hypertension.

A potential follow up to the current study would be to examine what barriers prevent the dietary changes that are essential in order to reduce the prevalence of hypertension and other cardiovascular disease (CVD) risk factors among Grenadian women. Adopting low-risk dietary and lifestyle factors has been shown to have the potential to prevent the incidence of hypertension among women (Forman & Curhan, 2009). Specifically, numerous cohort studies have found that the dietary approach to stop hypertension (DASH) diet has been successful in reducing blood pressure (Rankins, 2005). Previous study have found that, specifically, afro-Caribbean women are aware of family history of cardiovascular disease, yet they are not likely to take preventative measures in combating the onset of CVD risk factors (Block et al., 2008). Why are preventative measures often over looked by these individuals? Additional research needs to be conducted on barriers that prevent women in Grenada from partaking in healthy lifestyles. There is more work to be done in Grenada to determine the variables that stand in the way of healthy dietary change in order to develop and implement effective clinical and public health strategies that lead to the sustainability of these changes.

Dietary Intake and Hypertension

The second research question was, when controlling for work status, age, and education level, what is the relationship between diet and hypertension among women in Grenada, West Indies?

A Chi-square test of independence was used to determine the relationship between dietary behaviors associated with hypertension and blood pressure diagnosis among women living in Grenada, West Indies. From this analysis it was found that adding salt to meals and eating sweets have a significant association with hypertension diagnosis. Although, the majority of both groups add excess salt to their meals, it was found that women who have not been diagnosed as hypertensive are more likely to add excess salt to their meals than women who have been told they had hypertension. This behavior has to potential to lead these women to becoming hypertensive. In addition, while living in the country of Grenada, the researcher found that a food item that was most often consumed, that was high in sodium, was a cracker called Crix. While interviewing the women for the questionnaire, when it come to the question "How often do you consume packaged store-bought foods or snacks?" a few of the women would specify that Crix was the packaged food that that they bought and ate most often. These women then explained that they put Crix crackers on their oatmeal in the morning, and would also use it as a topping or as a side for the dishes that they made for dinner. The United States Food and Drug Administration recommend that a healthy individual get 2,300 mg daily of sodium and individuals who are sensitive to high blood pressure get less than 1,500 mg daily of sodium. Regular Crix crackers have 230 mg of sodium for 10 crackers and multigrain Crix crackers have 270 mg of sodium for 10 crackers. Although this does not seem like much, if a hypertensive woman were to eat two servings a day, they would be at one-third of their recommended level of daily sodium intake. While living on

the island the researcher found that these crackers were cheap and enjoyable and could see how an individual may eat more than one serving a day. It was also noted by the women that if they were to eat the Crix crackers, they opted for the multigrain because it was better for them, but unfortunately this is not necessarily the case, as they are higher in sodium than the regular Crix crackers.

While, eating foods that are high in sugar is not as popular in Grenada as it is in the United States, it was also found that women who eat sweets are more likely to have high blood pressure than women who choose to never eat sweets. Although it is not a direct cause, eating foods high in sugar increases the risk of becoming obese, which in turn increases the likelihood of developing hypertension (Hall, 2000). Saltfish and Oil down, both local traditions, were consumed frequently by the women in this study. These items are typically prepared using a lot of sodium and oil. Arihihenbuwa's Pen 3 Cultural Model can be used to create awareness to healthy alternatives to these dishes while being mindful of the culture and history they represent.

This study did not explore the understanding of the complication of excess sodium or sugar on the body, therefore, it cannot be said that women are willingly harming themselves. It can be concluded that despite knowledge of dietary behavior risk factors and awareness of hypertension, women continue to partake in unhealthy behaviors related to disease. However, these women may not be the ones to blame. Urbanization, the drastic social, economic, and environmental transformations of rural areas (United Nations, 2017), is said to be damaging to

underprivileged populations (Popkin, 2006). Urbanized trends tend to see an influx of imported foods, which lead to higher consumption of sodium and refined grains and high fat and high sugar foods (Ezzati & Riboli, 2013). This is more noticeable in low-and-middle income counties where these factors severely impact their health. The availability of these unhealthy resources hinders the ability of these induvial to meet their daily health needs, indicating that major inequalities of health exist in Grenada.

Study Limitations

Several limitations much be acknowledged. First, a major limitation of the study was selection bias of the sample. Data was collected through the clinics provided by St. George's University and the Grenada Food and Nutrition Council to ensure the safety of the researcher and volunteers. This, however, did not allow for probability sampling of the population, so the results cannot be generalizable to the whole Grenadian population. The results can only be inferred in a population like that of the women who attend the One Health, One Medicine clinics or health clinics around the island, who seek out health care.

A second limitation of the study was self-reported data. Participants were asked to self-report their measurements, height and weight, as well as recall the last time a medical professional took their blood pressure and whether they were diagnosed as hypertensive. Participants were also asked to recall how often they consume certain types of foods.

Thrid, the final limitation of the study was that the researcher was not able to use the results of the quantitative analysis in qualitative interviews with the participants. This was due in part to time limitations and funding. To have stronger results, the researcher intends to continue this study with qualitative interviews of key members of the community in Grenada, West Indies.

Summary and Future Research

Previous research examined the prevalence of cardiovascular disease and the effects of cardiovascular disease on men and women living in Grenada. This study is unique in that it assessed the dietary knowledge related to risk factors associated with non-communicable disease of women in Grenada, West Indies. The study's focus on women was important to understanding their local norms, beliefs, and attitudes towards health to tailor programs specific to their community.

In summary, the purpose of this research study was to assess the relationship between dietary behaviors and knowledge of dietary risk factors associated with hypertension among women in Grenada, West Indies. Although, these findings can only be generalized to the 103 women who participated in this survey, they make an important contribution to the burden of non-communicable disease risk factors in the Caribbean. Findings from this research suggest two phases of exploration that are imperative to make healthy lifestyle changes successful in Grenada.

As the first research question of this study suggested, a next step to accomplish healthy lifestyle changes is to determine the personal barriers that inhibit positive dietary change associated with the prevention of hypertension diagnosis. Partaking in a behavior change to combat disease is one of the most difficult things to do, especially modifying one's diet. The Pen 3 Model could be used in line with the World Health Organizations Global Hearts Initiate to fight hypertension among women in Grenada, by determining and addressing the barriers of making healthy behavior changes while enhancing disease prevention strengths. One of the goals of the Global Hearts Initiative is to reduce sodium intake and to reach this, a first step in changing beliefs is to understand what is standing in the way. Women in this study are knowledgeable about the dietary risk factors associated with disease. These women were also mindful of their own health status and continued that attentiveness by visiting a health fair or community health center for a physical exam. It is important to encourage the continuation of these positive healthy behaviors among women in Grenada. This can be achieved by using the Pen 3 Model as a guide to promote these positive health behaviors, thus allowing for an effective method of addressing the obstacles that are preventing the success of these positive behaviors among all individuals in the community (James, 2004).

As the second research question of this study suggested, community-based efforts are required to make successful changes. Socioeconomic disparities in diet are evident, and strategies to prevent the substantial non-

communicable disease burden among disadvantaged socioeconomic groups from reaching its full proportion are essential for these individuals. The goal of the World Health Organization for 2025 is to achieve a 25% reduction in non-communicable disease mortality, by reducing the population's mean sodium intake to 2 grams per day. Results from this study found that the women added excess sodium to meals, consumed a diet high in sugary foods, and acknowledge that they used Crix crackers for most of their meals. Although, Grenada has a Food Based Dietary Guidelines to promote healthful diets and behavior change, more needs to be considered for successful changes. Currently, Grenada is not on the World Health Organization's list of countries to focus on to combat the global threat of non-communicable disease, but as the evidence shows from this research and previous research, they should be a target country. Joining the Global Hearts Initiative would be beneficial in reducing the amount of salt in the foods that are imported to Grenada that would then be beneficial in reducing the incidence of non-communicable disease risk factors on the Island.

High income countries such as Finland and the United States have shown that through preventative measures, risk factors for cardiovascular disease can be reduced. Strategies and interventions to prevent the non-communicable disease epidemic from reaching its full proportion are available (Pomerleau, Lock, Khai, & Mackee, 2005), and with today's advancements in technology these strategies and interventions should be in all countries. By 2030, The World

Health Organization wants to reduce premature deaths from non-communicable disease by 30% (WHO, 2016). It is essential that policy makers, governmental agencies, and scholars come together and fight this non-communicable disease epidemic by controlling the rate of urbanization in low and middle-income countries. For the island of Grenada, West Indies, the primary step in this fight would be securing funding and support from the World Health Organization to start the Global Hearts Initiative. This would reduce the preventable risk factors of non-communicable disease by promoting healthy diets and providing access to adequate medical care for everyone in the community. Determining barriers and promoting positive and realistic solutions to healthy choices are needed to encourage Grenadian women, and their families, to begin making these healthy lifestyle changes successful.

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APPENDICES

APPENDIX A: STUDY QUESTIONNAIRE

Directions: Please circle one answer choice or write your answer if there are no choices provided.

1. **Sex**
   a. Male
   b. Female
2. **Age:** _____

3. **What is your Marital Status?**

   a. Single/living alone
   b. Single/not living alone
   c. Married/not living alone
   d. Divorced
   e. Widowed
4. **What is your Work Status?**

   a. Student
   b. Unemployed
   c. Housework
   d. Self-employed
   e. Employed-Agriculture
   f. Employed-Construction/Manufacture
   g. Employed-Company/Government/Professional
   h. Retired
   i. Other:_____
5. **Who lives with you? (Check all that apply)**
   a. No-one, I live alone
   b. Partner/spouse
   c. Own children
   d. someone else's children
   e. parents
   f. brothers/sisters
   g. grand-children
   h. Other adult relatives
   i. Other adults who are not family members
   j. Other: _____

6. **What is your highest level of education?**
   a. primary school
   b. some secondary school
   c. completed secondary school
   d. technical/trade school
   e. certificate/apprenticeship
   f. University/tertiary qualification
7. **Where do you live?**
   a. Carriacou
   b. St. Andrew
   c. St. David
   d. St. George
   e. St. John
   f. St Mark
   g. St. Patrick
8. **How often do you exercise for 20 minutes or more?**
   a. Never
   b. 1-2 days a week
   c. 3-5 days a week
   d. 6-7 days a week
   e. A few times a month
9. **What type of exercise do you do?**
   a. Walking
   b. Running
   c. Gardening
   d. Cleaning
   e. Swimming
   f. Other:_____

Directions: Interviewer assisted questions. <u>Measurements</u>

10. Height: _____
11. Weight: _____
12. Blood pressure: _____/_____

Directions: Circle one answer for each question. <u>Blood Pressure (Pressure)</u>

13. When was your last blood <u>pressure</u> measured?
    a. w/in last 6 months
    b. w/in last 12 months
    c. 2-5 years ago
    d. not w/in last 5 years
    e. Never

14. Have you ever been told by a health professional that you have high blood <u>pressure</u> or hypertension?
    a. Yes
    b. No
    c. Uncertain

15. Have you tried to change your lifestyle in order to lower your blood <u>pressure</u> during the last 12 months?
    a. Yes
    b. No
    c. Uncertain

16. Have you ever taken medications to lower blood <u>pressure</u>?
    a. Yes
    b. No
    c. Uncertain

17. Right now, are you taking medications to lower your blood <u>pressure</u>?
    a. Yes
    b. No
    c. Uncertain

18. What is NORMAL <u>systolic blood pressure</u> in your opinion?
    a. Less than or equal to 120
    b. Between 121-140
    c. 140 or higher
    d. it is dependent on age
    e. when a person feels good

19. What is NORMAL <u>diastolic blood pressure</u> in your opinion?
    a. Less than or equal to 80
    b. Between 81-90
    c. 90 or higher
    d. it is dependent on age
    e. when a person feels good

Directions: Circle one answer for each question.

Health Behavior Knowledge

1. Eating a lot of fat can cause heart problems.	Yes	No	Uncertain
2. Eating a lot of fat can cause obesity.	Yes	No	Uncertain
3. Eating a lot of sugar can cause heart problems.	Yes	No	Uncertain
4. Eating a lot of salt can cause heart problems.	Yes	No	Uncertain
5. Not eating enough fruit can cause heart problems.	Yes	No	Uncertain
6. Not eating enough fruit can cause obesity.	Yes	No	Uncertain
7. Not eating enough vegetables cause to heart problems.	Yes	No	Uncertain
8. Not eating enough vegetables can cause obesity.	Yes	No	Uncertain
9. Eating too much food can cause obesity.	Yes	No	Uncertain
10. Obesity increases the risk of developing diabetes (Sugar).	Yes	No	Uncertain
11. Obesity increases the risk of developing hypertension (high pressure).	Yes	No	Uncertain
12. Weight gain increases the risk for heart problems	Yes	No	Uncertain
13. Lack of physical activity can cause obesity	Yes	No	Uncertain
14. Lack of physical activity can cause heart problems.	Yes	No	Uncertain
15. Obesity can cause heart problems	Yes	No	Uncertain
16. High blood cholesterol (Fat) can cause heart problems.	Yes	No	Uncertain

Directions: Circle one answer for each question. Fill in the blank if there are no choices provide.

Food Consumption

1. **What kind of fat do you use at home while cooking meals?**
    a. Vegetable oil
    b. Olive oil
    c. Margarine
    d. Butter
    e. Lard
    f. No fat at all
    g. I don't know
    h. Other _____

2. **What kind of fat do you use on breads?**
    a. Butter
    b. Lard
    c. Margarine
    d. None
    e. Other_____

3. **What kind of milk do you/your family usually drink?**
    a. Whole milk
    b. Low fat milk/ Skim milk
    c. Powdered Milk (Nestle)
    d. Don't drink milk
    e. Other _____

4. **What kind of dairy products (cheese/cream) do you eat?**
    a. Whole milk
    b. Low fat/ Skim
    c. Don't eat dairy
    d. Other
    _____

5. **Do you add salt to your meals?**
    a. Never
    b. When food isn't salty enough (a little)
    c. Almost always before tasting (a lot)

6. **What type of fat do you use when frying your foods?**
    a. Vegetable oil
    b. Lard
    c. Olive oil
    d. Coconut oil
    e. I don't fry my foods
    f. Other _____

7. **How often do you fry your foods?**
    a. Never
    b. 1-2 days a week
    c. 3-5 days a week
    d. 6-7 days a week
    e. A couple of times a day

8. **How often do you drink alcohol?**
    a. Never
    b. 1-2 days a week
    c. 3-5 days a week
    d. 6-7 days a week
    e. A couple of times a day
    f. Occasionally (holidays/celebrations)

9. **How often do you drink Water?**
    a. Never
    b. 1-2 glasses a day
    c. 3-5 glasses a day
    d. 6 or more glasses a day
    e. Other:_____

10. **If your parents are deceased, how did they pass away?** *Place an M next to option for "Mother" and F for "Father".*
    a. Heart disease
    b. Diabetes
    c. Cancer
    d. Other:_____

Directions: Circle one answer for each question.

How often do you consume the following each week?	1-2 times	3-5 times	6-8 times	8 or more	0 times
a. Potatoes	Rarely	Sometimes	Often	Always	Never
b. Rice/macaroni	Rarely	Sometimes	Often	Always	Never
c. Cereals (cornflakes/porridge)	Rarely	Sometimes	Often	Always	Never
d. Cheese/curds	Rarely	Sometimes	Often	Always	Never
e. Milk & milk products	Rarely	Sometimes	Often	Always	Never
f. Chicken	Rarely	Sometimes	Often	Always	Never
g. Fish	Rarely	Sometimes	Often	Always	Never
h. Meat	Rarely	Sometimes	Often	Always	Never
i. Fresh vegetables	Rarely	Sometimes	Often	Always	Never
j. Other vegetables (fried)	Rarely	Sometimes	Often	Always	Never
k. Fresh fruit	Rarely	Sometimes	Often	Always	Never
l. Sweet pastries (cookies/cupcakes)	Rarely	Sometimes	Often	Always	Never
m. Sweets (candy/chocolate)	Rarely	Sometimes	Often	Always	Never
n. Soft drinks	Rarely	Sometimes	Often	Always	Never
o. Fruit juices (not fresh)	Rarely	Sometimes	Often	Always	Never
p. Eggs	Rarely	Sometimes	Often	Always	Never
q. Salted Fish (salt fish, smoked herring, mackerel)	Rarely	Sometimes	Often	Always	Never
r. Sea Food other than Fish (Lambie, Lobster, Crab)	Rarely	Sometimes	Often	Always	Never
s. Stewed Foods	Rarely	Sometimes	Often	Always	Never
t. Pre-packaged store bought foods/snacks	Rarely	Sometimes	Often	Always	Never

APPENDIX B: MTSU IRB APPROVAL

IRB
INSTITUTIONAL REVIEW BOARD
Office of Research Compliance,
010A Sam Ingram Building,
2269 Middle Tennessee Blvd
Murfreesboro, TN 37129

MIDDLE TENNESSEE
STATE UNIVERSITY

IRBN001 - EXPEDITED PROTOCOL APPROVAL NOTICE

Friday, July 15, 2016

Investigator(s):   Angela Fachini (Student PI) and Denise Bates (FA)
Investigator(s') Email(s): angela.fachini@mtsu.edu; denise.bates@mtsu.edu
Department: Health & Human Performance

Study Title: *"Cardiovascular Disease Risk in Grenadian Women"*
Protocol ID: **16-2263**

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU Institutional Review Board (IRB) through the **EXPEDITED** mechanism under 45 CFR 46.110 and 21 CFR 56.110 within the category *(7) Research on individual or group characteristics or behavior* A summary of the IRB action and other particulars in regard to this protocol application is tabulated as shown below:

IRB Action	APPROVED for one year	
Date of expiration	6/7/2017	
Participant Size	400 (FOUR HUNDRED)	
Participant Pool	**Adult attendees of SGU One Health One Medicine Health Fairs**	
Exceptions	Permitted to recruit participants be executing the approved agreement form	
Restrictions	1. Only Women aged 18 or older 2. The names of the sites where the study has been conducted must be reported when requesting for a continuing review or when submitting a final report (UPDATED ON 07.15.2016).	
Comments	The original approval notification was not mailed to the investigators (05/10/2016). The Compliance Office has made appropriate date of extention compensate the time loss.	
Amendments	**Date** 7/15/2016	**Post-approval Amendments** 1. Permitted to include adult participants who are customers of grocery stores or visitors to churches (St. George, Grenada). 2. An agreement template to be used by the investigating team to seek permission from appropriate approval authority to allow the research conducted at their facility has also been approved

This protocol can be continued for up to THREE years (6/7/2019) by obtaining a continuation approval prior to 6/7/2017. Refer to the following schedule to plan your annual project reports and be aware that you may not receive a separate reminder to complete your continuing reviews. Failure in obtaining an approval for continuation will automatically result in cancellation of this

IRBN001   Version 1.3   Revision Date 03.06.2016

Institutional Review Board   Office of Compliance   Middle Tennessee State University

protocol. Moreover, the completion of this study MUST be notified to the Office of Compliance by filing a final report in order to close-out the protocol.

Continuing Review Schedule:

Reporting Period	Requisition Deadline	IRB Comments
First year report	5/7/2017	INCOMPLETE
Second year report	5/7/2018	INCOMPLETE
Final report	5/7/2019	INCOMPLETE

The investigator(s) indicated in this notification should read and abide by all of the post-approval conditions imposed with this approval. Refer to the post-approval guidelines posted in the MTSU IRB's website. Any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 494-8918 within 48 hours of the incident. Amendments to this protocol must be approved by the IRB. Inclusion of new researchers must also be approved by the Office of Compliance before they begin to work on the project.

All of the research-related records, which include signed consent forms, investigator information and other documents related to the study, must be retained by the PI or the faculty advisor (if the PI is a student) at the secure location mentioned in the protocol application. The data storage must be maintained for at least three (3) years after study completion. Subsequently, the researcher may destroy the data in a manner that maintains confidentiality and anonymity. IRB reserves the right to modify, change or cancel the terms of this letter without prior notice. Be advised that IRB also reserves the right to inspect or audit your records if needed.

Sincerely,

Institutional Review Board
Middle Tennessee State University

APPENDIX C: SGU IRB APPROVAL

St. George's University

Institutional Review Board

8 April 2016

Angela Fachini
Human Performance, Health concentration
Middle Tennessee State University
Email address: angela.fachini@mtsu.edu

Re: Approval of SGU IRB Application 16014-"Cardiovascular Disease Risk in Grenadian Women"

Dear Ms. Fachini,

Subsequent to your application for approval for the use of human participants in the captioned research project by the St. George's University Institutional Review Board (IRB), this is to advise that your revised application is hereby approved.

If there are no obstacles and no changes to the research protocol as approved, kindly note that we shall require a progress report twelve months following the date of approval. An annual summary report is due no later than **Monday, 10th April 2017**. The form is also posted on the IRB page of the St. George's University's website. Please submit it to the IRB Administrator, Kareem Coomansingh, email kcoomans@sgu.edu, telephone 473 444-4175 x 3221 and fax 473 444-4388. An e-version is preferred.

In the event that any change(s) is anticipated, as the Principal Investigator, you must notify the IRB to seek permission to make such change(s) before you can proceed. Should you have any questions regarding this approval, please contact the IRB Administrator.

Outcomes of research must be provided to the IRB/SGU Office of Research. Any publications or conference presentations arising from the research should be shared with the Office of Research. All conference presentations and publications are listed in the SGU Annual Report. A comprehensive list of past completed research projects can also be found in this report.

Sincerely,

Robert Hage, MD, PhD, DLO, MBA
Chair, Institutional Review Board
Professor, Department of Anatomical Sciences

cc: Calum Macpherson, PhD, DIC, Director of Research, St. George's University

St. George's University • Grenada • West Indies
Telephone: 473 444-4175 x 3221 • Email: kcoomans@sgu.edu

St. George's University

Institutional Review Board

25th August 2016

Angela Fachini
Human Performance, Health concentration
Middle Tennessee State University
Email address: angela.fachini@mtsu.edu

Re: Approval of Modifications to SGU IRB Application 16014- "Cardiovascular Disease Risk in Grenadian Women"

Dear Ms. Fachini,

Subsequent to your request for modifications to your previously approved research project by the St. George's University Institutional Review Board (IRB), this is to advise that your revised study protocol is hereby approved.

If there are no obstacles and no changes to the research protocol as approved, kindly note that we shall require a progress report twelve months following the date of approval. An annual summary report is due no later than **Friday, 25th August 2017**. The form is also posted on the IRB page of the St. George's University's website. Please submit it to the IRB Administrator, Kareem Coomansingh, email kcoomans@sgu.edu, telephone 473 444-4175 x 3221 and fax 473 444-4388. An e-version is preferred.

In the event that any change(s) is anticipated, as the Principal Investigator, you must notify the IRB to seek permission to make such change(s) before you can proceed. Should you have any questions regarding this approval, please contact the IRB Administrator.

Outcomes of research must be provided to the IRB/SGU Office of Research. Any publications or conference presentations arising from the research should be shared with the Office of Research. All conference presentations and publications are listed in the SGU Annual Report. A comprehensive list of past completed research projects can also be found in this report.

Sincerely,

Robert Hage, MD, PhD, DLO, MBA
Chair, Institutional Review Board
Professor, Department of Anatomical Sciences
    cc: Calum Macpherson, PhD, DIC, Director of Research, St. George's University

---

St. George's University • Grenada • West Indies
Telephone: 473 444-4175 x 3221 • Email: kcoomans@sgu.edu

APPENDIX D: CONSENT FORM

Dissertation Research Study

"Cardiovascular Disease Risk in Grenadian Women"

1. **Research topic**: The purpose of this study is to assess the knowledge and understanding of dietary risk factors associated with hypertension among women in Grenada, West Indies.

2. **Goal:** We are hoping to find gaps in knowledge and understating around diet related risk factors for disease. The goal is to use the findings to improve nutrition programs though out the island, especially those associated with non-communicable chronic diseases.

3. **Your role:** As a participant you are being asked to complete a blood pressure and body measurements, health knowledge, health history, and dietary recall questionnaire. The researcher and trained volunteers will assist with taking your blood pressure reading, height, and weight measurements. You are being asked to fill out the rest to the best of your knowledge. The estimated amount of time to complete the survey is 10-20 minutes.

4. **What we will do with the sample/information you give us:** This study will be used as the dissertation research project by Angela Fachini as partial requirement for the Doctorate of Philosophy in Human Performance at Middle Tennessee State University. The results from this research will assess the knowledge of the Food and Dietary Guidelines and the understating of diseases from diet. The findings will be used to develop additional practices for the dietary guidelines to support a better understanding of diet related chronic disease risks. The results of this dissertation project may be published.

5. **Why you might want to do this**: The potential benefits for you, the participant, would be to assess your knowledge about diet related risk factors for chronic disease which would allow to create a specific program towards individuals with chronic non-communicable disease.

6. **Why you might *not* want to do this:** The study does not anticipate any discomforts, inconveniences, and or risks dealing with hypertension or dietary knowledge. However, it may be possibly for uncertainty/unawareness of risk and risk factors for hypertension until completing study's questionnaire. St. George's University medical students will be at the health clinic to assist and provide information on reducing the likelihood of hypertension diagnosis through diet, exercise, and medical care.

7.   **You can say no:** You do not have to do this. If you do it, you can stop at any time. Doctors and nurses at the university and this health fair will still treat you when you need help.

8.   **Who to call:** If you have more questions later or if you have a problem due to doing this, please call or e-mail.

Researcher:	-or-**The IRB should be contacted if the participant has any ethical concerns:**
Angela Fachini, PhD Student	Kareem Coomansingh
Angela.fachini@mtsu.edu	SGU IRB Administrator
Institution	St. George's University
MTSU, Tennessee, USA	True Blue Campus
Phone: (473) 403-2638	Phone: (473) 444-4175 Ext. 3221

APPENDIX E: LETTER OF AGREEMENT

Letter of Agreement to Conduct Research Study

Investigator(s):   Angela Fachini (Student PI) and Denise Bates (FA)
Investigator(s') Email(s):   *angela.fachini@mtsu.edu; denise.bates@mtsu.edu*
Study Title: *"Cardiovascular Disease Risk in Grenadian Women"*
Protocol ID: 16-2263
Approval Date: **07.15.2016**
Expiration Date: **07.07.2019**

Date:

Dear Angela M. Fachini,

      I am familiar with your research project titled 'Cardiovascular Disease Risk in Grenadian Women' and your desire to collect data on or in front of our property. I understand the role of to be limited to allowing a space to interview the subjects of your research.

      We have also discussed the role of   and I am satisfied that the safety and welfare of your participants are adequately protected as described in the research protocol. In addition, I understand that this research will be carried out following sound ethical principles and that the participation of all individuals in this research is strictly voluntary. I understand that every attempt will be made to protect each participant's privacy and confidentiality; however, the identity of the participants will be known by others in this public place.

      I understand that the investigator cannot provide me with data that might allow anyone other than the research team to identify anyone's answers. Therefore, as an official representative of   , I agree to allow you to conduct your research at our agency/institution.

Sincerely,

x _J. Emery DN_

Name: Judith Emery
Title: District Nurse
Agency/Institution: Paradise Medical Clinic
Address: Paradise St. Andrew

For Electronic Entry

Letter of Agreement to Conduct Research Study

Investigator(s): Angela Fachini (Student PI) and Denise Bates (FA)
Investigator(s') Email(s): angela.fachini@mtsu.edu; denise.bates@mtsu.edu
Study Title: *"Cardiovascular Disease Risk in Grenadian Women"*
Protocol ID: **16-2263**
Approval Date: **07.15.2016**
Expiration Date: **07.07.2019**

Date:

Dear Angela M. Fachini,

I am familiar with your research project titled 'Cardiovascular Disease Risk in Grenadian Women' and your desire to collect data on or in front of our property. I understand the role of to be limited to allowing a space to interview the subjects of your research.

We have also discussed the role of and I am satisfied that the safety and welfare of your participants are adequately protected as described in the research protocol. In addition, I understand that this research will be carried out following sound ethical principles and that the participation of all individuals in this research is strictly voluntary. I understand that every attempt will be made to protect each participant's privacy and confidentiality; however, the identity of the participants will be known by others in this public place.

I understand that the investigator cannot provide me with data that might allow anyone other than the research team to identify anyone's answers. Therefore, as an official representative of , I agree to allow you to conduct your research at our agency/institution.

Sincerely,

X Laurel Andrew

Name: Laurel Andrew
Title: District Nurse
Agency/Institution: Grand Bras Medical Centre
Address: Grand Bras St. Andrew

For Electronic Entry

Letter of Agreement to Conduct Research Study

Investigator(s):   Angela Fachini (Student PI) and Denise Bates (FA)
Investigator(s') Email(s): *angela.fachini@mtsu.edu; denise.bates@mtsu.edu*
Study Title: *"Cardiovascular Disease Risk in Grenadian Women"*
Protocol ID: **16-2263**
Approval Date: **07.15.2016**
Expiration Date: **07.07.2019**

Date:

Dear Angela M. Fachini,

I am familiar with your research project titled 'Cardiovascular Disease Risk in Grenadian Women' and your desire to collect data on or in front of our property. I understand the role of **(Agency/Institution name)** ...St. Georges Health Center.................................. ....to be limited to allowing a space to interview the subjects of your research.

We have also discussed the role of **(involved agency/institution individuals)** ....St. Georges Health Center.................................... and I am satisfied that the safety and welfare of your participants are adequately protected as described in the research protocol. In addition, I understand that this research will be carried out following sound ethical principles and that the participation of all individuals in this research is strictly voluntary. I understand that every attempt will be made to protect each participant's privacy and confidentiality; however, the identity of the participants will be known by others in this public place.

I understand that the investigator cannot provide me with data that might allow anyone other than the research team to identify anyone's answers. Therefore, as an official representative of **[agency name]** ...St. Georges Health Center, I agree to allow you to conduct your research at our agency/institution.

Sincerely,

_____(Signature)
Name: LYDIA BROWNE.
Title: Executive Secretary Grenada food and nutrition Council.
Agency/Institution: St. George's Health center
Address: St. George's, Grenada

For manual entry – USE BLACK OR BLUE INK ONLY

Letter of Agreement to Conduct Research Study

Investigator(s): Angela Fachini (Student PI) and Denise Bates (FA)
Investigator(s') Email(s): *angela.fachini@mtsu.edu; denise.bates@mtsu.edu*
Study Title: *"Cardiovascular Disease Risk in Grenadian Women"*
Protocol ID: **16-2263**
Approval Date: **07.15.2016**
Expiration Date: **07.07.2019**

Date:

Dear Angela M. Fachini,

I am familiar with your research project titled 'Cardiovascular Disease Risk in Grenadian Women' and your desire to collect data on or in front of our property. I understand the role of (**Agency/Institution name**) Grand Anse medical center Grenada Food & Nutrition Council to be limited to allowing a space to interview the subjects of your research.

We have also discussed the role of **(involved agency/institution individuals)** Grand Anse medical center and I am satisfied that the safety and welfare of your participants are adequately protected as described in the research protocol. In addition, I understand that this research will be carried out following sound ethical principles and that the participation of all individuals in this research is strictly voluntary. I understand that every attempt will be made to protect each participant's privacy and confidentiality; however, the identity of the participants will be known by others in this public place.

I understand that the investigator cannot provide me with data that might allow anyone other than the research team to identify anyone's answers. Therefore, as an official representative of **[agency name]** Grand Anse medical center, I agree to allow you to conduct your research at our agency/institution.

Sincerely,

Stephanie Lewis (Signature)
Name: Grand Anse medical center
Title: Nutrition Education Program Coordinator
Agency/Institution: Grand Anse medical center
Address: St. George, Grenada (Lime)

For manual entry – USE BLACK OR BLUE INK ONLY