

Modifying DASH and Improving Dietary Habits to Reduce Hypertension Among Micronesian  
Populations in Hawai'i

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### Abstract

Hypertension is an important risk factor for developing cardiovascular diseases. Though hypertension is a common condition, which affects all ethnicities, Micronesians develop complications of untreated hypertension at a younger age. Many of these complications could be avoided with implementation of lifestyle modifications, including dietary approaches. This project introduced the Dietary Approaches to Stop Hypertension (DASH) plan to Micronesians living on the Big Island of Hawai'i and evaluated effectiveness of the DASH plan. Concepts from the Health Belief Model and from Rogers' Diffusion of Innovations Theory helped in guiding interventions during the development of the project. Thirty adult Micronesian participants were recruited during the Health Fest in Hilo in 2018. Blood pressure among participants in the hypertensive category was lowered after four weeks (mean systolic blood pressure and mean diastolic blood pressure changes were 18.9 mmHg and 10.3 mmHg, respectively). Thirty six percent reported that they had increased their consumption of vegetables. Twenty five percent recorded daily consumption of vegetables. This project identified several modifiable risk factors for hypertension and barriers to adherence to the DASH plan. Self-efficacy is a modifiable behavior, and the Health Belief Model could be targeted in future projects aimed at enhancing adherence to the DASH plan.

*Keywords:* DASH, hypertension, self-efficacy, Micronesian, Health Belief Model, Diffusion of Innovations Theory

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## List of Abbreviations

BMI	Body Mass Index
CBPR	Community-Based Participatory Research
CDC	Centers for Disease Control and Prevention
COFA	Compact of Free Association
COFACAN	Compact of Free Association Community Advocacy Network
CVD	Cardiovascular Diseases
DASH	Dietary Approaches to Stop Hypertension
DBP	Diastolic Blood Pressure
EB	Evidence Based
EAP	Easy Access Project
FAS	Freely Associated States
HBM	Health Belief Model
HF	Heart Failure
JNC	Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure
MU-BI	Micronesians United - Big Island
NCD	Non-communicable Diseases
PIP	Practice Inquiry Project
PRWORA	Personal Responsibility and Work Opportunity Reconciliation Act of 1996
SBP	Systolic Blood Pressure
SSB	Sugar Sweetened Beverages
USPSTF	U.S. Preventive Services Task Force
WHO STEPS	WHO STEPwise Approach to Surveillance

Modifying DASH and Improving Dietary Habits to Reduce Hypertension Among Micronesian Populations in Hawai'i

This paper examines how the introduction and adaptation of the Dietary Approaches to Stop Hypertension (DASH) plan may improve self-management of hypertension in Micronesian populations on the Big Island of Hawai'i. Hypertension is one of the most common health problems that primary care providers encounter during their practice. Numerous studies have been done to address this problem, and primary care providers have knowledge and excellent understanding of what could be done to help their patients. However, uncontrolled or poorly controlled high blood pressure is still one of the biggest causes of developing heart diseases and cerebrovascular accidents. The Centers for Disease Control and Prevention (CDC) National Vital Statistics Report for 2016 indicated that the five leading causes of death in the U.S. were, in rank order: diseases of the heart, malignant neoplasms, accidents (unintentional injuries), chronic lower respiratory diseases, and cerebrovascular diseases (Heron, 2018). The CDC (2014) reports that at least 200,000 deaths from cardiovascular diseases could be prevented every year, and more than 50% of these deaths happen to people who are 65 years old or younger. In other words, one in three heart-related deaths could be avoided. Reasons for premature heart-related deaths are well-known. They include tobacco use, high blood pressure, high blood cholesterol, type 2 diabetes, poor diet, being overweight, and lack of physical activity (Yoon, Bastian, Anderson, Collins, & Jaffe, 2014). About 30% of American adults (about 75 million people) have high blood pressure, and about half of these people have their high blood pressure under control (Merai et al., 2016). About 59 million Americans have prehypertension (National Heart, Lung, and Blood Institute, 2006). Six million of Americans live with heart failure (HF), and because of the projected increase in life expectancy, more Americans are expected to develop

heart diseases (Vellone, Pancani, Greco, Steca, & Riegel, 2016). HF is one of the major causes of death in developed countries, and it is becoming one of the major causes of death in the developing world including Micronesia. Though prevalence of HF is common in the United States population, Micronesians develop cardiovascular diseases at younger age when they are compared to other ethnic groups (Hagiwara, Yamada, Tanaka, & Ostrowski, 2015). The following issues make the problem of management of hypertension in Micronesian populations in Hawai'i worse: poverty, lack of education, inadequate English proficiency, limited access to healthcare services, substandard and crowded living conditions, discrimination at work, recent immigration, and higher risk for substance abuse.

## **Chapter 1**

### **Problem Statement**

Hypertension affects one third of American adults, and about a quarter of the adults have prehypertension (CDC, 2018). Modern medicine understands causes and risk factors for developing hypertension, consequences of untreated high blood pressure, screening methods for hypertension, and a variety of treatment options. However, only about 50% of people with hypertension have their blood pressure under control (CDC, 2018). This fact shows that barriers to treatment of hypertension still exist, and these barriers should be investigated and addressed. Another issue to consider is that hypertension screening, treatment, and outcomes of untreated hypertension are worse among ethnic minorities, including Micronesian populations. Chapter One addresses some of these barriers.

Uncontrolled hypertension may lead to serious health conditions: ischemic heart disease, heart failure, cerebrovascular disease, vascular dementia, and chronic kidney disease. Therefore, prevention, early detection, and appropriate treatment of hypertension are important. Often, the

first strategy that primary care providers employ when they treat their patients with hypertension is lifestyle modification. One of the big changes in lifestyle is following the DASH eating plan. By including more fresh vegetables and fruits in their diet and by limiting fat and processed foods that are high in sodium, people may reduce their blood pressure. According to the National Heart, Lung, and Blood Institute (2006) and the Mayo Foundation for Medical Education and Research (2016), by following the DASH diet, people with hypertension may be able to lower their blood pressure by a few points in just two weeks. Knowing the effect of the DASH on hypertension, primary care providers recommend their patients with hypertension to apply the DASH plan in their daily lives. However, many patients struggle with the concepts of the DASH. They may have limited knowledge about the DASH plan, inadequate financial resources to purchase healthy food, or they have limited access to the right food due transportation issues. Moreover, there is a cultural aspect that providers have to consider when they work with populations from different cultures; the food choices that are palatable for one culture could be inedible for another. Even consistency and ways of preparing food may be different. Therefore, cultural competence may bring valuable tools to primary care practices if providers learn about cultural views on food, preparation, consumption, and their patients' expectations.

Another issue that should be considered is that Micronesians who live in Hawai'i are sicker than people of other ethnicities living in Hawai'i. They have higher rates of hospitalizations, higher severity of diseases, and they are younger than other residents when they are hospitalized (Hagiwara et al., 2015). High incidence of poor health among Micronesians could be related to limited access to primary care services, unique immigration status, and low income. For example, after collecting data from 24 non-military hospitals in Hawai'i from 2010 to 2012, Hagiwara et al. (2015) stated that "the total cost of the 3486 Micronesian

hospitalizations in the three-year study period was \$58.1 million and 75% was covered by Medicaid” (p.14). Hagiwara et al. (2015) stated that Micronesians were not just sicker, but they were also younger when they were admitted to the hospitals. For instance, the average age of Micronesians who were admitted with cardiac issues was 55.6 years old which was 8 years younger than for native Hawai’ians, 14.5 years younger than for Whites, and 20.2 years younger than for Japanese (Hagiwara et al., 2015). This disproportionally higher incidence of heart diseases among Micronesians in Hawai’i shows that providers should be more effective in their efforts to control hypertension among this group. Different strategies and tools should be considered when they educate their patients, and culturally-appropriate modifications in the DASH eating plan may be an effective tool that will reduce blood pressure among Micronesians with high blood pressure or prevent hypertension in people who are at risk for it.

### **Goal of the Project**

The goal of the project was to improve self-management of hypertension and prevention of hypertension among Micronesian populations in Hawai’i by following the DASH diet. According to Moran, Burson, and Conrad (2014), the focus of healthcare delivery began to change from “acute, episodic care to prevention” (p. 133). This is particularly true for hypertension where episodic care does not effectively manage long-term effects of uncontrolled hypertension. Hypertension is a chronic condition requiring lifestyle modification and constant attention from patients and their families.

Different approaches and guidelines have been developed, and some of them encourage patient-management of hypertension. Several theoretical works were published that support the principle of developing self-efficacy as an important precursor for self-management of chronic medical conditions (Arnold et al., 2005; Bandura, 1977; Fan & Lv, 2014). The developed

guidelines have identified the following daily routines: monitoring symptoms of hypertension, medications adherence, checking blood pressure, daily weights, and even self-adjusting doses of medications. However, there are not many guidelines that would address cultural preferences in diet among Micronesian populations. In order to better care for this vulnerable population, it may be beneficial to learn how Micronesians view hypertension, effects of diet on blood pressure, and their willingness to adapt the DASH diet to their lifestyles. It may be important to develop a DASH plan that is congruent with the cultural expectations and is accepted by the Micronesian community.

### **Aims of the Project**

Aim #1 of the project was to critically appraise the evidence based (EB) guidelines for support self-management of hypertension in the context of culturally congruent care for Micronesians. This aim was achieved by completing three objectives: (1) literature review, (2) conversations with healthcare professionals and Micronesian community members about healthy diet and teaching strategies, (3) development of a modified DASH plan that would be culturally-based, efficient, and simple to follow.

Aim #2 was to test the modified DASH plan by conducting a pilot study and investigating the effectiveness of the modified DASH plan. The modified DASH plan included traditional Micronesian food, and a simplified version of the DASH plan that was published by the National Heart, Lung, and Blood Institute (2006). There were three objectives: (1) recruit a sample of participants for the pilot study, (2) survey the participants in two weeks and in four weeks for feedback, adherence to the diets, assess their post intervention blood pressure, and (3) develop a heart-healthy diet plan based on participants' feedback and results of the study.

## Chapter 2

The review of literature was performed in order to understand the background of why Micronesians were at the greater risk for hypertension, complications of hypertension, early disability, and death. The following search engines were used CINAHL, MEDLINE, PubMed, and Google Scholar. The literature review provided understanding of the Micronesian culture, traditions, the historical background of the Micronesian populations, Americanization of Micronesia, health literacy, ways of sharing the health information, and health disparities that effected Micronesians. Another aspect of the literature review was conducted in order to examine what was known about dietary preferences, nutritional composition of food, and current diet. The third aim of the literature review was to collect information about the DASH plan, the effectiveness of the DASH in reduction in blood pressure, and how the DASH was implemented in other studies and research.

### **Background and Significance**

**Ethnohistorical Data.** Micronesia consists of several independent countries. The Federal States of Micronesia (FSM) includes four states: Chuuk, Kosrae, Pohnpei, and Yap. Also, Micronesia encompasses the following independent countries: the Marshall Islands, Palau, Guam, and the Commonwealth of the Northern Mariana Islands. Most of Micronesia had been colonized by Spain, Germany, Japan, and the United States from 1945-1986 (Okamoto et al., 2008).

In the 1950's, the U.S. began enforcing an "Americanization process" on Micronesian states that created an American dollar-dependent economy (Pobutsky, Krupitsky, & Yamada, 2009). The "Americanization process" changed traditions, economy, and political systems in Micronesia. Lowe (2003) stated that youths in Chuuk lost many of the following traditional

institutions that were used to educate them before the colonization: storytelling, “cooperative fishing and farming, ritual dancing, and competitive feasting, men’s and women’s community settings associated with *imw* (‘house’) and *wuut* (‘meeting house’)” (p. 194). About 30% of Chuukese have wage jobs which are provided by the local government (Lowe, 2003). The United States has been responsible for the increase in imported processed foods to the Micronesian states (Lowe, 2003; MacNaughton & Jones, 2013). People stopped relying on sea produce and farming; they started relying on the imported products: refined sugar, white rice, and canned meat. Most households are dependent on the imported products, and those products contribute to increase in the risks of metabolic syndrome and obesity among the Micronesians.

According to agreements between the U.S. and Micronesian nations, the U.S. will continue the militarization of the islands, and Micronesians may migrate to the U.S. to receive health care among other benefits. In 1986, the first Compact of Free Association (COFA) allowed citizens of the Freely Associated States (FAS) free entry into the U. S. (Okamoto et al., 2008; Pobutsky et al., 2009). Since 1986, the U.S. government greatly reduced federal funding to the Micronesian states. Lack of the internal financial resources and loss of the U.S. federal funds influenced Micronesians to leave their homeland to seek new educational and employment opportunities in the U.S. According to Pobutsky, Buenconsejo-Lum, Chow, Palafox, and Maskarinec (2005), “the Compacts enable citizens of these Freely Associated States (FAS) to travel and emigrate to the United States not as “immigrants” but as migrants without visas or time limits” (p. 59). Because of the effects of sea level rise and poverty at home, many Micronesians leave their homes and migrate to the U.S.

Another reason for migration is health care. Lack of financial resources contributed to inadequacy of health services in Micronesia. The focus of the health care in Micronesia is on the

public health and primary care, and there are limited secondary and tertiary services in FAS (Yamada & Pobutsky, 2009). In a study that was funded by the National Cancer Institute, Kroon et al. (2004) reported that cancer was the second leading cause of death in the Marshall Islands possibly because the Marshallese were exposed to high amount of radiation due to nuclear weapons testing (as cited in Pobutsky et al., 2005). Micronesians experience one of the highest rates of suicides among their youth. According to Lowe (2003), the rates of suicide among Micronesian youth have been reported to be 10 to 13 times higher than the rates for youth in the United States; the suicide epidemic has remained unchanged for the last three decades. The suicide rates reflect the high level of psychological stress that youth experience in the FAS.

**Nuclear Testing.** The United States was among other countries which used the South Pacific region for nuclear testing for decades. In 2002, Pollock wrote that nuclear weapons testing was conducted from the mid-1940s to the mid-1950s, and after that, ballistic missile and ballistic missile defense testing were conducted later in the Marshall Islands (as cited in Pobutsky et al. 2009). The U.S. started nuclear testing in the Marshall Islands in 1946, and the testing continued until 1962 (MacKay, 1995). Up to these days, some parts of the region continued to be uninhabitable because of the high radiation. High radiation forced many people out of their homes.

**Micronesian populations in Hawai'i.** According to Pobutsky et al. (2005), "the 2000 U.S. Census listed 22,223 non-Chamorro Micronesians ('alone or in any combination') in the total U.S. population" (p. 61). About 15,000 Micronesians live in Hawai'i (Pobutsky et al., 2009). Thus, about one percent of all Hawai'i residents are Micronesians. Migrants from Micronesian countries make up over 23% of all migrants in Hawai'i (Pobutsky et al., 2005).

**Access to healthcare.** According to Hagiwara et al. (2015), when the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA) was created, Micronesian migrants were placed in a class of Non-Qualified Aliens. Qualified Aliens could get federal benefits after five years of entry to the United States. COFA migrants were allowed indefinite residency. However, because they were Non-Qualified Aliens, Micronesians could never qualify for any federal benefits, including the Medicaid. PRWORA greatly reduced federal Medicaid funding, and states were forced to take responsibility to provide health coverage to COFA migrants via Med-QUEST. In 2008, the Hawai'i Department of Human Services announced plans to stop offering Med-QUEST to COFA migrants because they would be enrolled into a new Basic Health Hawai'i Plan, a program with many restrictions and reduced coverage. The new program could cover the cost of four prescription medications per person. Because of the inadequacy of the new plan, many Micronesians stopped seeing their providers. The providers also did not understand: what parts of provided care would be covered, and what parts of care would not be covered. Established Micronesian communities and legal groups took this unjust ruling to the court. In 2014, the court ruled that Hawai'i is not constitutionally obligated to include COFA migrants into Medicaid programs. After the exclusion of Micronesians from Medicaid programs, Micronesians had to choose plans through Hawai'i Health Connector. Having low income, Micronesians could only purchase plans with high copayments and deductibles; thus, many of them became uninsured. Uninsured people or people with health plans which include high copayments and deductibles tend to avoid preventive and primary care. Moreover, Choi (2008) stated Marshallese migrants do not seek health care until they are very sick, and their sickness is usually manifested as intolerable pain. Hypertension is usually a painless condition, and when care is delayed, people become sicker, and cost of treating

severe illnesses increases as sicker people are admitted to the hospitals. According to Hagiwara et al. (2015), Hawai'i policymakers and Micronesian communities became involved in the COFA Community Advocacy Network (COFACAN). The goal of the coalition is to restore Medicaid benefits for COFA migrants and to reclassify COFA Migrants as Qualified Aliens under PRWORA. Many COFA serve in the U.S. military, and COFA migrants have sacrificed their homes and land. They just want justice. Today, the U.S. government has failed to fulfill its obligations to address healthcare needs of COFA migrants.

Tan, Haumea, Juarez, and Grimm (2014) collected their information in Hawai'i Island in which they included Chuukese and Marshallese patients of a non-profit clinic. In this study 81% of the Chuukese were obese, and 43% of the Marshallese patients were obese. The majority of the participants had less than 20,000 dollars annual income, and 79% of patients participated in Medicaid. Ninety four percent of the Micronesian patients met the federal poverty line. In contrast, 43% of the general clinic patients met the federal poverty line. A specially designed program was developed which would be compatible with the educational status of the participants, their reading status and writing abilities. Chuukese and Marshallese patients had higher rates of obesity (57%), and on average, they had 4.4 chronic medical conditions. These findings demonstrated that many Micronesians in Hawai'i had numerous disadvantages when they were compared to other populations in Hawai'i: language, education, poverty, and access to healthcare. Therefore, programs which would be specifically aimed at this population should be developed and implemented in order to reduce development and progression of the chronic diseases.

**Health Disparities in the U.S.** The disease burden of Micronesians is significant, and the problem is compounded by socio-economical issues, which many Micronesians experience. For

example, the Department of Health's Easy Access Project (EAP) statistics offers social services and referrals to recent migrants with potential health issues. The EAP statistics show that despite that only one percent of Hawai'i residents are Micronesians, Micronesians contribute 12.8 % of EAP service population (Pobutsky et al., 2005). The EAP data informs that Micronesians need help in job placing, housing assistance, and translation services.

After collecting data from 24 non-military hospitals in Hawai'i from 2010 to 2012, Hagiwara, Juarez, Yamada, Miyamura, and Sentell (2016a) stated that "the total cost of the 3486 Micronesian hospitalizations in the three-year study period was \$58.1 million and 75% was covered by Medicaid; 23% of Native Hawaiian, 3% of Japanese, and 15% of white hospitalizations were covered by Medicaid" (p. 1). Micronesians who live in Hawai'i are sicker than other ethnicities living in Hawai'i; they have higher rates of hospitalizations, higher severity of diseases, and they are hospitalized younger than other population groups (Hagiwara et al., 2015). Hagiwara, Miyamura, Yamada, and Sentell (2016b) stated the following:

Despite US responsibilities under the compacts, the Personal Responsibility and Work Opportunity Act of 1996 (Pub L 104– 193,110Stat.2105) deemed COFA migrants ineligible for most federal aid programs, including federal support for participation in Medicaid. In 2014, the Ninth Circuit Court ruled that states are not obligated to provide COFA migrants with Medicaid, reducing insurance coverage and health care access for an already vulnerable community. (p. 485)

This ruling has a particular importance because the Micronesian population is one of the fastest growing populations in the United States; at the same time, Micronesian population has one of the highest burdens of chronic conditions such as certain cancers, diabetes, heart disease, and infectious diseases (Hagiwara et al., 2016b). As a result of the nuclear testing, many

Micronesians still experience high rates of cancer. Breast, cervical, and thyroid cancers were the top three types of cancers among Micronesians referred to the Tripler Army Medical Center in Hawai'i (Pobutsky et al., 2009). Hagiwara et al. (2016b) reported that Micronesians had higher hospitalization rates for endocrine cancer, and substance abuse disorders than other Hawai'i residents.

After surveying 2522 Micronesians living in Hawai'i, Pobutsky et al. (2009) found that 35% of Micronesians adults over age of 40 years old had diabetes, 22.3% had cardiovascular diseases (CVD), 20% cancer, 7 % reported respiratory illness, and 10% had more than five chronic illnesses. Risk factors such as alcohol use was similar in both Chuukese and Marshallese ethnic groups (16.4% and 19.0%, respectively), 19.6 % of Marshallese and 15.2% Chuukese reported current smokers in their households (Pobutsky et al., 2009). Also, the study informed that 12.7% did not have health insurance, and 60.3% had Hawai'i MEDQUEST because of low-income.

**Health disparities in Micronesia.** Gopalani et al. (2017) reported that out of 2349 premature deaths in the Federal States of Micronesia, 1970 deaths (over 83%) were related to non-communicable diseases (NCD). Among adults aged 30 to 69 years, the top four leading causes accounted for almost 70% of all deaths and 85% of NCD-specific premature deaths. Diabetes-related deaths were the leading cause of death and ischemic heart diseases were the second most common reason of early death. High prevalence of lung cancer was associated with high level of smoking (25-30% of population in Pohnpei and Chuuk).

Watson et al. (2015) reflected on findings of the WHO STEPwise Approach to Surveillance (STEPS). This survey included 2,184 responders from Palau: 75% were Palauans and 19% were Filipinos. Among Palauans, 58% of men and 69% of women were betel nut

chewing. Overweight and obesity were common findings: 84% of men and 86% of women. Hypertension was found in 55% of men and in 49% of women aged 25 to 64 years. Even younger Palauans (between age of 25 and 34 years old) had high rate of hypertension (36% men and 25% women). The STEPS results demonstrated unusually high rates of NCD. According to the data released by the Ministry of Health, the leading cause of death in Palau was cardiovascular diseases (24.3%). Palau is a middle income country of 20,000 people. As it was proposed in literature, people with higher income and educational level may be early adopters. They adopt unhealthy diet and lifestyles because they can afford to purchase imported foods, including unhealthy processed foods. This leads to obesity, increased prevalence of hypertension, and higher risks of CVD. Immigrants from Philippines were healthier in this study because they were migrant workers engaged in physical labor, and they had lower income. Body mass index (BMI) tends to increase with the economic growth and income. This finding was similar to the study conducted by Hosey et al. (2014).

Hosey et al. (2014) investigated how socioeconomic status may affect risks for cardiovascular diseases in Pohnpei. The authors used data from the STEPS from 2002, in which 1638 adults aged 25-64 years were included. The survey included educational status, employment, income, tobacco use, consumption of fruits and vegetable, physical activity, access to healthcare, physical and biochemical measures (blood pressure, BMI, waist circumference, blood sugar, blood lipids, and blood glucose), age, sex, and place of residence. Over 50 % of Pohnpeian people reported three to five risk factors for developing CVD. Results showed that participants with a primary-level education had significantly higher rates of smoking. At the same time, people with higher education levels had lesser levels of physical activities than people with less education. People with higher income had higher blood pressure. Unemployed

people had a smaller waist circumference than employed people. Interestingly, the results showed an inverse association between education level and hyperlipidemia and blood pressure. Higher income positively associated with higher blood pressure readings. These findings differ from other studies in lower to middle income countries where higher education was associated with lower blood pressure. Hosey et al. (2014) suspect that if people adopt risky behaviors, education causes people to realize health-related consequences of risky unhealthy behaviors, and they change their lifestyles and adopt healthier lifestyle choices. After they modify their lifestyles, their blood pressure will be reduced compared to less educated people. In agreement with the authors, it is possible to hypothesize that as people in Micronesia will evaluate the link between unhealthy diet, smoking, limited physical activities and increased risk for developing CVD, they will change their lifestyles to include consumption of fruits and vegetables.

MacNaughton and Jones (2013) note that Micronesians are affected by NCD at increasing rates. However, infectious diseases are still a major concern: tuberculosis, Zika virus, and hepatitis A. The authors discuss the health problems which some Micronesians have in Hawaii, and that the United States has an obligation to treat these conditions after the Nuclear Testing disaster and agreements which the U.S. government made with Micronesian countries.

**Effects of the dietary changes on health of Micronesian populations.** Before the process of the Americanization, people were dependent on food which was grown on the islands, and fishing was an important part of their lifestyles. Food used to be traded or shared between family members, communities, and neighboring islands. With the Americanization process, people started working for local governments and for the United States government. Centralized urban communities were developed to accommodate new societal changes. Working in these urban communities, people did not have time or land to grow their own food. They started

purchasing food. Micronesians and other Pacific islanders have similar health problems and social-ecological changes that affected the way they ate, worked, and socialized. From families and group-oriented societies which were based on mutual respect and reciprocity, Micronesian societies had changed to more individualistic-orientations. Before, people used to exchange their food, and it was almost forbidden to sell food. Today, in a dollar-based economy, people have wage-jobs, and they purchase food from local stores and markets.

Pollock (2017) describes how different foreign voyagers brought food with them to the Pacific islands. Some voyagers brought new varieties of taro and yam. Others brought bread, cabbage, potatoes, and beer. After the World War II, diversity of food increased even more as packaged food started arriving to the Pacific islands. Pacific islanders traditionally consumed plant food with a small piece of fish or coconut. Pigs were eaten during celebrations or given as gifts to visitors. Pollock describes historical means of sharing food, fermentation process, and pounding local foods. With introduction of imported foods, diversity of food increased. However, this diversity led to numerous health concerns among Pacific islanders. NCD began emerging from dietary changes, globalization, and urbanization.

Mohammanezhad, Mangum, May, Lucas, and Ailson (2016) looked at modifiable and non-modifiable risk factors for developing CVD. The authors reviewed articles, and the results showed that even younger Pacific Islanders were more likely to develop risk factors for CVD. These happen because of the exposure to advertisement of unhealthy food choices, reduction in physical activities, and changes in traditional ways of life. The authors argue that before, families cooked and ate together all meals as an extended family, and children played outside. With modernization of lifestyles, many families became nuclear families. According to this review, women may have additional barriers which increase their risk factors for developing CVD. They

have numerous cultural barriers to participation in physical activities: dress code, lack of transportation to get to the sport centers, cultural expectations limiting involvement of women in certain physical activities.

In the 1960s, Micronesia was flooded with imported foods of high-energy and low-nutritional values (Pollock, 2017). Though changes in Micronesian diet had occurred before the 1960s, the food which was introduced in the 1960s was different. Before, Micronesians planted imported varieties of taro, breadfruit, sweet potato, and other crops to increase yield or harvesting season. In the 1960s, the United States started bringing processed food which could be stored without concerns of spoilage. Canned meat and fish, white rice, and sugar became staple foods in Micronesia. Micronesians used to raise chickens and pigs. Many of them would fish and share their catch with family and friends. Because of no refrigeration or electricity, it made sense to eat fish on the day of the catch. Many families grew vegetables and fruits. However, when people started working for government, they lost their connection with land. They lost abilities to grow food. Instead of trading and sharing local food, they started buying imported food. Imported food became more popular because of the availability, accessibility, easiness, readiness, and cheap price. The imported food was available despite droughts, storms, rising sea levels, and other natural or man-made disasters. Micronesians stopped fishing and farming. Many people started viewing farming as a dirty and unpopular job. In the Cook Islands, farmers were described as *repo taro* (dirty taro) or “nothing men” (Connell, 2014). The modern diet included: white rice, noodles, flour, sweets, canned meat, turkey tails, and other food of low-nutritional value. Imported food became prestigious and desirable, first, among government workers, and then, among the rest of people. It was easier to open a can of fish than fishing a whole day. Many people developed sedentary lifestyles. Sedentary lifestyles and consumption of

a diet which is high in simple carbohydrates and fat, led to development of numerous health conditions which Micronesians had never experienced before: obesity, metabolic syndrome, diabetes, hypertension, strokes, and vitamin deficiencies. Micronesian people did not just change their dietary habits; they changed their lifestyles, traditions, and even society.

Ahlgren, Yamada, and Wong (2014) discussed that over the past 70 years many changes occurred in the Marshall Islands which led to poor nutrition and health outcomes. People stopped relying on traditional farming and fishing, and they became dependent on the imported food. Climate, culture, and nutritional changes had led to widespread child malnutrition, diabetes, and other diseases. The authors argued that agricultural programs which were initiated had no valuable and long-lasting results because of the poor quality of soils, frequent droughts, storms, and rising sea level. Some of the proposed strategies to overcome nutritional deficiencies are growing crops which do not require intense tending: breadfruit and pandanus, and changing public health policies so as to limit importation of processed foods.

Aldwell, Caillaud, Galy, Frayon, and Allman-Farinelli (2018) report that 80% of people are obese in some Pacific islands. Consumption of sugary products leads to tooth decay, obesity, chronic inflammation and chronic diseases. Urban communities have high rates of consumption of sugar, and people tend to have more dental caries. The studies show that traditional diet included fish, starchy vegetables and fruits. However, this diet was replaced by white rice and processed snacks. Meat replaced fish. The review of different interventions to regulate access to sugar sweetened beverages (SSB) among youth generated limited numbers of the programs. One of the possible interventions could be peer led groups. These groups were associated with reduction of SSBs “compared to control groups at 3 months follow up” (p. 7). Other strategies

include: adopting taxes on the imported SSB and implementation of school-based and community-based programs to limit SSB.

Christoforou et al. (2015) wrote that consumption of large amounts of salt contributed to high blood pressure. Salt reduction activities were implemented in 22 Pacific Island countries including the Marshall Islands. Barriers and opportunities for salt reduction were identified. Some of the barriers are: salt is culturally important, and salt is a part local cuisine, there is limited availability of fresh food, and salted meat and fish add flavor to meals.

Aitaoto et al. (2017) gathered data from a focus group of Chuukese living in Chuuk and Hawai'i. The data shows that there are socio-cultural and environmental barriers to physical activities. There are the following sedentary behaviors: "purposeful sitting, lazy sitting, wasting time, resting and recreation sitting, and no-can move" (p. 247). Some participants reported that purposeful sitting (weaving mats and weeding grass) was useful. Lazy sitting was associated with watching television or talking stories. Wasting time was linked to "just being lazy" or feeling angry and frustrated. "No-can move" was associated with illness or injury, and resting was associated with being fulfilled and satisfied. Barriers to physical activities included lack of sidewalks, playgrounds, and gyms. There were problems with stray dogs, poor street lightening, high level of crimes, and unsafe environments. Cultural limitations also existed; for example, participants stated that women and men could not dance in one room. It was strange for Chuukese to observe dancing men and women together; therefore, they did not participate in the dancing activities. Therefore, it is important to create anti-sedentary activities which would be appropriate for Chuukese: age-appropriate, collectivistic, and gender-appropriate.

Collier et al. (2018) write about how Palauans view obesity and diet. The authors implemented several strategies to educate Palauans about healthy and unhealthy food choices by

implementing and modifying the “Stop Light Diet” program. The authors used a Community-Based Participatory Research (CBPR) model during program development. The CBPR model was chosen because it utilizes local knowledge of health problems and community engagement. Knowing people’s perception on diet, health and illness may help in development of future interventions which may combat the epidemic of NCD among Micronesian populations.

Englberg, Marks, and Fitzgerald (2004) noted that changes in nutrition led to development of chronic diseases: diabetes, heart diseases, and cancer since the 1960s. Micronesians used to rely on staple foods: banana, breadfruit, pandanus, and taro. Consuming these types of foods, Micronesians had enough provitamin A and total carotenoids. The study was done in Kosrae and Pohnpei, and it included 91 male and 55 female participants. For Pacific populations, including Micronesians, food is often presented in a social context; for Westerners, food is viewed in a biological context. In Micronesia, health of an individual is often viewed as a group concern, not an individual matter. Micronesian participants reported that views on local food had changed. Local food was considered to have low status when the food was compared to imported food. Englberg et al. (2004) cited Finau’s article to show how Micronesians view their health. Finau reported that Micronesians had the following living concepts: “Nature will provide for us in time” and “Man’s life is controlled by destiny.” Englberg et al. (2004) wrote that reciprocity and sharing of food was viewed as a norm, and selling of local foods was often unacceptable. For example, there was a belief that breadfruit would not produce if crops were sold. The researchers looked at different types of food that could be grown on the islands and suggested that banana, breadfruit, giant swamp taro, and pandanus could be grown to meet vitamin A requirements. It seems that people do not feel that food choices they make may improve or worsen their health. This article shows how culture may affect people’s perception on

health, nutrition, and these cultural views should be considered when healthcare providers educate their patients about nutrition.

Graz, Kitalong, and Yano (2015) looked at different plants, which were used to treat NCD in Palau. Palauans have one the highest rate of NCD: obesity, diabetes, and hypertension. Even among youth, the prevalence of obesity is high: 26% of high school students are obese or overweight, and 64% of them do not participate in any physical activities. Two health concerns were targeted: hypertension and diabetes. Thirty different plants were investigated. *Morinda citrifolia* (Noni) and *Phaleria nishidae* were used the most. Both plants were used to treat excess weight, diabetes, and high blood pressure. Users of *Phaleria nishidae* reported reduction in blood sugar. *Morinda citrifolia* and *Phaleria nishidae* were linked to reduction in blood pressure. Seventy-three percent of people with diabetes used modern medicine, and 63% of people with hypertension used modern medicine. The use of modern medicine may influence some of the findings in this study. Still, more research is needed to understand how traditional medicines may affect NCD treatment among Palauan and other Micronesians.

Kaufer et al. (2010) conducted a program “Go Local” in Pohnpei. “Go Local” was aimed to promote locally grown food. The program increased provitamin A carotenoid intake, vitamins, minerals, fiber, increased dietary diversity by planting and consuming giant swamp taro, breadfruit, pandanus varieties, green leafy vegetables, and fruits. “Go Local” decreased consumption of white rice by 25-30 %. Local fruits: mountain apples, pineapples, papaya, guava were eaten four times per week, and imported fruits: canned pineapple, apples, oranges were consumed less than one time per week. Frequency of sugary items: doughnuts and cookies decreased significantly during the two years of the research. Consumption of processed meat and

imported eggs remained the same during the study. This study showed that planting vegetables and fruits may reduce consumption of sugar and white rice among the population on the island.

McCubbin, Pearce, Ford, and Smit (2017) conducted research in Funafuti. The authors surveyed 50 households and 25 key informants. About 10% experienced food shortage in the previous month, and 52% ate processed imported food because they could not afford healthier local food. Funafuti is located in the western South Pacific Ocean. Local foods are: fish, pulaka, breadfruit, coconut, greens, and pandanus. Urbanization led to reduction in size of agricultural lands. However, many people raised chickens and pigs because these animals could be raised in small areas. Pigs were consumed during economic difficulties, special occasions, and feasts. Chickens were the second most popular protein, and 64% of people consumed store-bought chicken one or two times per week. The stores sell fatty chicken legs and mixed pieces of chicken: wings, drumsticks, and thighs. When people were asked about their favorite food, they reported: fish and breadfruit. When they were asked about what food they consumed the most, the surveyed people responded: rice, fish, and chicken. People verbalized frustration because they had to buy food from a store. For them, sharing food and work were essential lifestyle practices. One of the informants mentioned that there was no meal times or portion control, and food should be “available whenever someone wants it...Here, when we cook, we go by quantity rather than quality” (p. 60). Though Funafuti is not a part of Micronesia, limited availability and accessibility of healthy foods are similar to the availability of healthy foods in Micronesia. People in Micronesia and Funafuti consume imported foods because of the low cost and availability. Imported foods are easy and fast to prepare, and climate changes do not affect the availability of processed foods. The authors’ research findings are similar to others: even if

people prefer eating local food, they often do not have a choice or opportunity to consume local produce.

**Effects of climate changes on Micronesian diet.** Communicable diseases used to be the main cause of diseases and deaths in the developing countries. Now, NCD became one of the biggest health concerns in many developing countries, including Micronesia. To understand what had changed in Micronesia and other Pacific islands and what had led to an increase in NDC, we need to consider changes in Micronesian history, geography, climate, politics, and society. Climate changes brought more problems for the Micronesian society. Severe weather, decimated reefs, rising sea levels, droughts, and salt water intrusions continue damaging agricultural land and limit production of fruits and vegetables. Some people are forced to leave their small outer islands because of the climate changes, and they have to relocate to large urban communities, or they have to emigrate to other countries.

McIver et al. (2015) stated that climate change contributed to diseases related to food, water, and vector. Some of the mentioned diseases which were related to climate change: obstructive airway disease, heart diseases, malnutrition, and infectious diseases. In addition to these conditions, authors argued that climate-sensitive health risks were linked to also mental and psychosocial health disorders. Climate change may lead to the lack of locally grown food, compromised food security, dependence on imported processed food, and increased consumption of energy-dense food.

Nunn, Runman, Falanruw, and Kumar (2017) looked at “traditional resilience to climate-driven changes in the Pacific” (p. 960). The authors studied population of Yap. To overcome salt water intrusion and “invading” mangroves, Yapese are building stone walls to protect taro-growing areas. However, raising sea levels continue endangering staple crops such as taro.

Coastal ground water salinization made it more difficult to obtain fresh water to drink, and people have to climb up slopes to springs for rainwater. Globalization and importation of cheap and unhealthy food have changed traditional food systems and decreased sustainability and diversity of local food. Despite modern climate challenges, Yapese have adapted by building walls to protect low-laying crops, planting ironwood and mangroves to reduce soil erosion, and using decomposed dead mangroves to plant crops. Change in climate transforms traditions and leads to relocation of the populations. It seems that Yapese among other Pacific nations demonstrate adaptive strategies that other countries may use in future as effects of rising sea levels will start impacting other areas. Perkins and Krause (2018) stated that climate change impacted Micronesians in different ways: rising sea levels, beach erosion, salt water intrusion, droughts, increasing sea surface temperatures, “increasing number of tropical storms,” and “ocean acidification” (p. 68.). The problems get worse because of remoteness and limited resources. In 2007, saltwater intrusion led to decimation of 75-90% taro crops in Falalop. Climate change forces people to migrate from outer islands and atolls to main islands.

As people’s lives are transformed by the climate change in the outer islands and atolls, these populations will continue experience social and economic challenges. These findings may help to predict changes in migration among Micronesians. Micronesians may be forced to migrate to other countries and islands including to Hawai’i because it may be difficult to adapt to the new environment, produce sustainable crops, and continue traditional social organization on the islands. All of these changes should be considered when nutritional programs for Micronesians in Hawai’i are created.

### **Screening and Diagnosis of Hypertension**

The U.S. Preventive Task Force (USPTF) (2019) recommends annual screening of adults aged 18 years or older, and the USPTF recommends obtaining blood pressure readings outside of the clinical settings prior to diagnosis of hypertension. Hypertension occurs in 30 % of the U.S. adult population (Merai et al., 2016). The usual onset is 30 years old; however, not many people with high blood pressure are diagnosed at that time (Keller, Sabatino, Winland-Brown, & Porter, 2011). As people age, more people become diagnosed with hypertension. Unfortunately, some people are diagnosed with hypertension after they have developed health-related complications from hypertension. According to the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) (Chobanian et al., 2003), blood pressure is classified in the following categories: normal, prehypertension, stage 1 hypertension, stage 2 hypertension (see Table 1).

Table 1

*Classification of Blood Pressure (JNC 7)( Chobanian et al., 2003)*

Category	SBP mmHg		DBP mmHg
Normal	Less than 120	and	Less than 80
Prehypertension	120-139	or	80-89
Stage 1 Hypertension	140-159	or	90-99
Stage 2 Hypertension	Above than 159	or	Above than 99

*Note.* SBP = systolic blood pressure; DBP = diastolic blood pressure.

### **Pathophysiology of Hypertension**

The normal blood pressure in adults is considered to be below 120 mm Hg systolic and 80 mm Hg diastolic. The systolic values between 121 mm Hg and 139 mm Hg or the diastolic

values between 81 mm Hg and 89 mm Hg are considered to be prehypertension, and these people are at the increased risk for developing hypertension in future (see Table 1). Though, according to the Eighth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 8), people with prehypertension may not be treated with antihypertensive medications, but instead, they may be encouraged to make lifestyle modifications: to increase daily physical activities, smoking cessation, stress management, and to make healthy food choices (James et al., 2014).

Hypertension is diagnosed when systolic blood pressure is consistently at or above 140 mm Hg and/or diastolic blood pressure at or above 90 mm Hg (see Table 1). Hypertension is diagnosed when either systolic or diastolic pressure greater than this range. Generally, two types of hypertension are identified. The first one, essential hypertension, does not have identifiable etiology, and it is the most common form of hypertension. Another type of hypertension is secondary hypertension, and it has identifiable etiology. Some of the common reasons for developing secondary hypertension are: obesity, kidney disease, chronic use of steroids, Cushing's syndrome, primary hyperaldosteronism, hyperthyroidism, and coarctation of the aorta.

Hypertension is a complex issue, and it is linked to modifiable risk factors: environmental factors, dietary choices, lack of physical activities, and unhealthy lifestyle practices.

### **Complications of Hypertension**

People who have hypertension usually cannot feel it, for they feel ordinary and healthy. It can be a challenge to convince “healthy-feeling” people with hypertension to take medications because people with hypertension usually do not feel anything abnormal. At the same time, prescribed antihypertensive medications may have debilitating side effects, and “healthy-feeling” people may stop taking these medications. Untreated hypertension or poorly controlled

hypertension may lead to target-organ damage including cardiovascular diseases, strokes, kidney damage, retinopathy, and vascular dementia. Unfortunately, when people develop target-organ damage, it could be difficult, expensive, and even too late to treat developed diseases. Therefore, it is important to screen all adults for high blood pressure, recommend healthy dietary choices, and establish rapport and trust between providers and patients. Development of healthy eating habits may become even more important among people who have limited or inadequate access to health care and medications.

### **Treatment of Hypertension**

According to JNC 7, treatment of hypertension should be initiated when patients have blood pressure above 140/90 (Chobanian et al., 2003). If patients have diabetes or chronic kidney disease, treatment should be initiated with the goal of keeping blood pressure below 130/80. Treatment guidelines had changed in JNC 8 (James et al., 2014). The blood pressure goal is below 150/90 among people who are older than 60 years old and without diabetes or kidney disease (James et al., 2014). If people are younger than 60 years old and without diabetes or kidney disease, the goal of treatment is below 140/90. If people have diabetes or kidney disease, blood pressure lowering medications should be initiated with the goal of keeping blood pressure below 140/90. According to JNC 8, pharmacological treatment usually starts if blood pressure is above 140/90, especially in people with cardiovascular complications, diabetes, or kidney disease. The target blood pressure in adults older than 60 years is less than 150/90, and in adults who are younger than 60 years is less than 140/90 (James et al., 2014). For nonblack patients with hypertension, thiazide, angiotensin converting enzyme inhibitors, angiotensin two receptor blockers, or calcium channel blockers used as the first choice for antihypertensive medications. For black patients with hypertension, thiazide diuretics or calcium channel blockers are initiated.

Depending on other risk factors and medical conditions, providers may choose different antihypertensive medications.

**Effects of the DASH on hypertension.** Though the guidelines of the initiation of treatment had changed over time, lifestyle modification recommendations remained the same. Usually, the first recommendation that primary care providers include in their teaching is lifestyle modifications: DASH plan, weight reduction, reduction in alcohol consumption, smoking cessation, increase physical activities, and stress reduction techniques. Depending on what are the patient's needs, the lifestyle changes may be different. However, the low-sodium diet that is rich in vegetables and fruits and low in saturated fat and processed food is recommended to all people with hypertension and prehypertension. Adherence to the DASH plan promote reduction not just in blood pressure, but it decreases total cholesterol and low-density lipoproteins (LDL), increases high-density lipoproteins (HDL), improves insulin sensitivity, and reduces weight in obese people.

According to Sacks et al. (2001) and Vollmer et al. (2001) DASH eating plan reduces systolic blood pressure by 8-14 mmHg (as cited in Chobanian et al., 2003). Appel et al. (1997) reported that the reduction in blood pressure was observed after first two weeks, and the reduction continued for the next six weeks. The DASH diet led to reductions in systolic (5.5 mmHg) and diastolic (3 mmHg) blood pressures among all participants, especially among participants with hypertension (systolic blood pressure and diastolic blood pressure changes were 10.7 and 4.7, respectively).

In 1999, Sacks et al. (2001) tested a theory that eating mainly vegetarian diet could reduce blood pressure. The authors included 459 adults with untreated systolic blood pressure less than 160 mmHg and diastolic blood pressure 80-95 mmHg. After participants consumed

typical American diet, they were divided on two groups according to assigned diets: a diet rich in fruits and vegetables, and the DASH diet. Among people with hypertension in the DASH group, the reduction in systolic blood pressure was 11.6 mmHg, and the reduction in diastolic blood pressure was 5.3 mmHg. The reduction in blood pressure was observed among the participants in the diet rich in fruits and vegetables; however, the reduction was lesser. According to Sacks et al. (2001), the DASH plan led to a mean systolic blood pressure reduction by 7.1 mmHg in participants without hypertension and by 11.5 mmHg in participants with hypertension. Saneei, Hashemipour, Kelishadi, Rajaei, and Esmailzadeh (2013) reviewed randomized controlled studies, and the findings concluded that systolic blood pressure was reduced by 6.74 mmHg, and diastolic blood pressure by 3.54 mmHg. Saneei, Salehi-Abargouei, Esmailzadeh, and Azadbakht (2014) conducted a systematic review of 17 randomized controlled trials in which systolic blood pressure was reduced between 1.67 and 12.7 mmHg. The reduction in diastolic blood pressure ranged from 1.2 to 10.2 mmHg.

In addition to reduction in blood pressure readings, adherence to the DASH plan may aid in combating other diseases and conditions such as diabetes, obesity, metabolic syndrome, kidney stone formation, and gout. Rai et al. (2017) reported that the DASH plan reduced risk of gout in men when the DASH plan was compared to Western diet. Juraschek, Gelber, and Choi, (2017) stated that DASH reduced serum uric acid among men and women. Azadbakht, Mirmiran, Esmailzadeh, Azizi, and Azizi (2005) reported that in men, the DASH plan led to increase in HDL by 7 mg/dL, lower triglycerides (-18 mg/dL), reduction in weight (-16 kg), fasting blood glucose (-4mg/dL), and in systolic blood pressure (-12 mmHg). Azadbakht et al. (2005) found similar results among women.

Steinberg, Bennett, and Svetkey (2017) stated that for the last 20 years, numerous studies showed effectiveness of the DASH plan in lowering blood pressure among people with hypertension and prehypertension. However, according to the National Health and Nutritional Examination Survey, adherence to the DASH diet remains poor among Americans: less than 1% of the U.S. population in 1988 to 2004 and in 2007 to 2012 (as cited in Steinberg et al., 2017). Steinberg et al. (2017) state that poor adherence to the diet could be due to energy-dense and nutrient-deficient inexpensive foods. Vegetables and fruits are more expensive and inaccessible for low-income people. Changes in communities and policies may improve accessibility of fresh vegetables. Collier et al. (2018) developed a community-based and culturally relevant program in Palau which combined several themes with goal to reduce obesity: healthy dietary choices, physical activities, reduction of stress, improvement of sleep patterns, handling challenges and rewards. The authors developed a theme of “Stop and go” foods to help to distinguish and select healthy foods. “Stop” represented foods which should be avoided or consumed in moderations, and “go” differentiated foods which could be consumed in unlimited quantity such as vegetables. Collier et al. (2018) simplified the “Stop Light Diet” (Epstein, Paluch, Beecher, & Roemmich, 2008) into “Stop and go” because there are not stoplights in Palau. Epstein et al. (2008) developed “Stop Light Diet” to treat pediatric obesity. The “Stop Light Diet” included traffic signals concept. “Red” is for energy-dense foods (ice cream, pizza, processed foods), “green” is for high in nutrient density and low in energy density foods (vegetables and fruits), and “yellow” is for foods with fat 2-5 g or sugar 10-25% calories per serving.

### **Adult Learning Strategies**

Recommended adult teaching techniques differ from techniques used for children. Russell (2006) writes that most adults are engaged in learning processes to create a change in

skills, behavior, knowledge, or attitudes. Adults have higher degree of motivation, previous experiences, and level of engagement. Therefore, mutual respect and trust between the teacher and the learner are important. Adults have past experiences and their own perspectives about a teaching subject. For example, they may not accept health education if the introduced information is perceived irrelevant and even foreign to their culture and lifestyles. Collier et al. (2018) write that some of the reasons for obesity in Palau are:

Large body size was good; difficulty managing weight during “customs” and social gatherings; when offered food, one must eat to demonstrate respect; few healthy food options were available; one had no control over body size; few traditions involved physical activity; no one to exercise with; not feminine to exercise for females; and no interest in changing diet. (p. 35)

Collier et al. (2018) suggest avoiding conversations about obesity or losing weight; indirect approach which is focused on well-being would be more culturally appropriate. Ballroom dancing is known to be a good method to increase physical activity. However, in Chuukese culture, men and women cannot dance together or in one room; Chuukese women and men will not dance together (Aitaoto et al. 2017). Aitaoto et al. (2017) write that “The majority of the patients reported tuning out the ‘exercise’ because they have heard it many times and felt that providers are required to say that for all conditions” (p. 249). Moreover, some may argue that jogging and walking are useless activities; on the opposite side, swimming, fishing, and growing vegetables could be more culturally appropriate physical activities to some people. As is seen in the above examples, primary care providers and health educators should learn more about Micronesian culture when they introduce information about lifestyle modification to Micronesians.

To engage adults with teaching, several learning styles should be used (Russell, 2006). The styles are: visual, auditory, and kinesthetic. For visual learners, pictures, brochures, graphs, movies, and presentations could be used. Auditory learners understand and accept information through conversation, discussion, or read aloud. Kinesthetic learners learn through hands-on experience. As Collier et al. (2018) write that Palauan culture is orally-based, and educators will be more successful if they verbally explain material instead of providing written pamphlets. For example, to introduce the DASH plan, an educator may use a brochure about the dietary plan, talk and discuss the plan, provide vegetables, and even cook together with learners. This approach will utilize all learning styles.

Collins (2004) writes about the several adult learning principles which could be used during education. Adult learners bring their life experiences and knowledge into the learning process. Adult learners are goal-oriented and motivated learners, and they learn better in an informal environment. They need respect, encouragement, and support; therefore, follow-up appointments may provide an opportunity to engage in conversation, discuss barriers, provide feedback, and praise success.

### **Conceptual Framework**

The conceptual framework for this project is the Health Belief Model (HBM). It is a common practice in any primary care clinics to advise patients to manage their chronic conditions by changing their lifestyles. In fact, it is the first recommendation which providers usually suggest for many medical illnesses. Lifestyle modification is recommended for prevention of hypertension as well as for managing hypertension and complications of hypertension such as heart failure (HF). However, many patients in spite of understanding of the benefits of the lifestyle changes fail to modify their lifestyles or to continue changes for long

periods of time. The HBM recognizes that in order to achieve long-lasting changes, patients have to believe that “perceived benefits” outweigh “perceived barriers.” Therefore, the HBM is presented as a continuous cycle in this project (see Figure 1). It may be difficult and almost impossible to achieve long-lasting changes from the beginning. It may take several attempts to start healthy lifestyle modifications. People should not be discouraged if they fail to achieve desired modifications. Development of senses of capability, self-efficacy, and strength should be encouraged and supported.

The HBM includes the following dimensions: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Rosenstock, Strecher, & Becker, 1988).



*Figure 1.* Modified Health Belief Model for Improving Dietary Habits

**Perceived susceptibility.** Hypertension is considered to be a “silent killer,” for people who have hypertension may not know about it for many years and even decades. Sometimes, people are finding out that they have hypertension after they have been diagnosed with HF, renal failure, metabolic syndrome, or when they have suffered an aneurysm, heart attack, or stroke. To overcome consequences of the late diagnosis of hypertension, the USPSTF (2017, 2019) recommends blood pressure screening in adults aged 18 years or older. Family history of

hypertension, cardiovascular diseases, renal failure, and metabolic syndrome may help to establish susceptibility to hypertension.

**Perceived severity.** Feelings about the severity may vary among people with hypertension. Some people may see hypertension as a nuisance that drains financial resources, some may evaluate possible consequences of leaving hypertension untreated, and some may see social consequences such as inability to work, provide for family, or be a burden on their families. Other people may see that members of their family suffered devastating cerebrovascular accident, for an example, and they want to avoid the same consequence of uncontrolled hypertension.

**Perceived benefits.** People who accept their susceptibility to hypertension and its complications may be encouraged to seek lifestyle changes that may improve their activities of daily living, prevent disabilities, and reduce psychological and physical impact of hypertension on their families. For example, Kaufer et al. (2010) conducted a program “Go Local” in Pohnpei. “Go Local” was aimed to promote locally grown food. The program increased provitamin A carotenoid intake, vitamins, minerals, fiber, increased dietary diversity by planting and consuming local fruits and vegetables. To combat obesity in Palau, Collier et al. (2018) developed a program “Fit Kit Palau” which combined physical activities, dietary approaches (“Stop and go” foods), motivation, techniques to reduce stress and improve sleep patterns. The majority of participants were interested in learning about the program because they saw the barriers to healthier lifestyles, and they wanted to learn about techniques that focused on increasing activity level and overcoming unhealthy eating patterns.

**Perceived barriers.** Barriers could be numerous and difficult to overcome. For example, information about the lifestyle changes is usually introduced via written material: handouts at the

clinics, internet material, drug inserts, etc. Some cultures, Micronesian culture in particular, may rely more on oral traditions. Collier et al. (2018) wrote that 54% of participants preferred face-to-face contact for a wellness-based “Fit Kit Palau” program. Even when educational material on hypertension management is translated into different Micronesian languages, some patients with hypertension may disregard it because they do not understand it, afraid to challenge medical authority, to ask for clarifications from the authority figures: medical doctors and nurse practitioners. Micronesian patients may see this educational approach as foreign to their culture. Even if the educational material is written on the fifth-grade level, will it fit cultural expectations? Traditionally, Micronesians learned about the life experiences through storytelling, personal communications, and not by using written symbols or words. The collection of the data on cultural expectations and traditions may increase effectiveness of interventions, and providers should investigate what physical, psychological, socioeconomic, and financial barriers their patients have in order to create an effective plan of care. Also, different cultures may view the same types of food differently. What some cultures consider a staple food, other cultures may see the same food as non-food. For example, according to Peltó (2017), the early research about the Shambaa diet in Africa described their diet as inadequate. However, only few cases of nutritional deficiencies were found among the Shambaa children. The Shambaa children have assigned work such as gathering wild foods and caring for family livestock. These children snack when they gather food or watching their animals. Their snack consists of wild greens and berries, which are a great source of vitamins and minerals. However, the Shambaa people do not consider the wild greens and fruits as a food, and they do not report the greens when they describe their diet.

**Cues to action.** What actions could lead to lifestyle changes? Will an educational handout on the DASH plan trigger the action among people at risk for hypertension or people who are diagnosed with hypertension? Will they read the material? Will they understand the DASH plan concepts? Will they accept the DASH plan that is suggested by the U.S. Department of Health and Human Services and by the American Heart Association? Will involvement of the community improve adherence to the diet as it happened in the “Go Local” campaign? If Micronesians modify the DASH plan, will this new dietary plan be effective and sustainable?

Collier et al. (2018) and Epstein et al. (2008) simplified dietary education by using “Stop and go” and a traffic light approach, respectively. This project implemented a similar approach of simplification of the DASH plan to fit needs of the Micronesian community. Instead of counting serving sizes, calories, daily amounts of fat and sugar, the participants were asked to add vegetables and fruits to their diet every day. Many Micronesians consume vegetables infrequently; their diet is based on “high energy and protein foods, followed by starch, sugary and fried foods” (Collier et al., 2018, p. 33). Just adding vegetables into the daily diet could make difference in blood pressure control and in their health. This simple approach could promote increase in daily consumption of fruits and vegetables without drastically changing lifestyles of the participants. “Add vegetables to every meal” expression may fit this population better because it eliminates the complexity of the diet teaching, and it introduces vegetables and fruits into their daily lives. At the same time, it promotes self-esteem among Micronesians by providing opportunity to choose which vegetables to consume, and how much to eat. Micronesians value independence and self-worth, and by encouraging independent choices, dietitians, educators and health care providers may improve adherence to the DASH plan.

Rogers (1983) proposed a diffusion of innovations theory that described the process by which new ideas could be communicated. There are four elements of the diffusion, “diffusion as the process by which (1) an innovation (2) is communicated through certain channels (3) over time (4) among the members of a social system” (Rogers, 1983, p. 10). All of these elements are important in order to implement new ideas. Innovation has to provide an advantage, has to be simple to understand, and be consistent with existing values and situations. Interpersonal channels of communication are effective when new ideas are introduced to another person, especially if the face-to-face exchange occurs between near-peers. Therefore, involvement of community leaders or faith leaders in promotion of healthy dietary choices may improve the diet in their community. The primary health providers have to understand the cultural expectations of their patients in order to communicate effectively healthy diet to their patients. The trust between providers and their patients could make a difference between adoption of the dietary changes and rejection of dietary modifications.

**Effects of self-efficacy.** One of the key concepts of the HBM is self-efficacy. According to Okamoto et al. (2008), Micronesians value independence. Independence is an internal or individual factor, and it should be considered. Self-efficacy is related to independence, and self-efficacy promotes problem-solving skills and encourages independence. Self-efficacy is a well-studied concept, and it is frequently cited in literature. Warren-Findlow, Seymour, and Huber (2012) interviewed 190 African Americans with hypertension about their self-efficacy and self-care activities. The authors found significant associations between good self-efficacy to manage their hypertension and adherence to medications, physical activity, not smoking, weight management and eating a low sodium diet. Self-efficacy in managing complications of hypertension could be difficult to measure. For example, people who develop HF may need more

support from their caregivers, and they may be less capable to manage the HF symptoms on their own. According to Fan and Lv (2016), people with HF have inadequate self-efficacy. Controlling depression and establishing social support may increase self-efficacy, and self-efficacy improves HF management (Fan & Lv, 2016). Britz and Dunn (2010) used a cross-sectional, descriptive study to determine if patients with HF had self-care deficits at the time of discharge from an acute care setting. Low self-care confidence was related to decrease in quality of life. The results concluded that patients with low self-care confidence required specific programs which could build their self-confidence prior to discharge from the acute care. Buck et al. (2015) stated that self-efficacy is important in self-care maintenance and in the improvement of quality of life among patients with HF. It is especially noticeable in patients with HF with less comorbidity. In the cross-sectional study, Peters-Klimm et al. (2013) focused on the potential non-modifiable and modifiable risk factors and resources; the study results suggested that potentially modifiable factors such as self-efficacy should be targeted. Thus, tailoring interventions which are aimed at improving self-efficacy among those diagnosed with hypertension or patients with HF may positively impact quality of life. Modification of the DASH plan by the Micronesians may improve self-efficacy and lead to long-term changes among the Micronesian populations in Hawai'i.

One of the theorists who developed the concept of self-efficacy was Albert Bandura. Bandura believed that self-efficacy was more about what “someone can do” than what “someone has” (as cited in the National Institutes of Health, n.d.). Bandura (1977) hypothesized that self-efficacy determines “whether coping behavior will be initiated, how much effort will be expended, and how long it will be sustained in the face of obstacles and aversive experiences” (p. 191). Bandura wrote that people create their own standards, and they try to achieve these

standards. If “self-prescribed standards” are achieved, people are rewarded. Failing the standards creates dissatisfaction and motivates people to change their behavior. Therefore, anticipated satisfaction and failed standards force people to make corrections in their behaviors. Bandura also noticed that people tend to avoid fearful situations, or the situations that they cannot cope with. Miscommunication, avoidance, and fear of changes are important issues that should be addressed by healthcare providers, educators, and policymakers. For instance, people who are diagnosed with hypertension have to go through emotional and psychological transformation, through denial, acceptance, and hopefully change in behavior in order to take control over their new condition. If people believe that they cannot do much about their debilitating condition, they will continue their lifestyles. People will not change their diet, adhere to treatment, or have the follow-up visits; thus, complications of hypertension may develop. Misunderstanding consequences of not adhering to treatment should be addressed. People who have or who develop a personal sense of mastery will be more active and persistent in their efforts. If people believe that they can manage their condition, and they have social support, they will be more inclined to change their lifestyles. For instance, Micronesian women often buy, decide what to cook, and prepare food for families. Thus, improving self-efficacy among women may help to overcome barriers, to change behaviors and lifestyles, and to accomplish desired goals. By educating communities, people may cook and eat traditional food that is low in sodium, sugar, and fat. They may also include locally available food that is not traditional, but these new food choices may be palatable and acceptable to their culture and taste. Therefore, people who have achieved self-efficacy will be empowered to seek change in their behavior, and they will be more inclined to adhere with therapy.

### **Chapter Three**

This chapter addresses methods used to conduct a project. From the literature review, the HBM concepts, and Rogers' *Diffusion of Innovations*, a pilot study was designed. This study was aimed at finding out what dietary methods and techniques could be used for primary prevention of hypertension or treatment of hypertension among Micronesian populations on the Big Island of Hawai'i. The following methods were used: designing a culturally appropriate dietary plan, recruiting 30 participants, providing them with a brief description of the DASH plan, materials, and evaluating their adherence to the DASH plan. During the pilot study, the participants commented on their barriers to eating healthy as well as their successes. The pilot study also provided information about prevalence of hypertension, and blood pressure readings among the participants.

### **Methodology**

The study design included a two-step approach. First, literature review, members of the Micronesians United-Big Island organization, and health care professionals provided background information for the project. Second, a pilot study was conducted to evaluate effectiveness and feasibility of the developed a tri-fold brochure about the DASH plan.

**Aim #1: Develop a culturally appropriate dietary plan by critically appraising the evidence based (EB) guidelines for support self-management of hypertension in the context of culturally congruent care for Micronesians.** In order to create a culturally appropriate diet plan and to develop effective teaching strategies, the following objectives were completed: appraising the EB guidelines for treatment and prevention of hypertension including the DASH plan, collecting information from healthcare professionals and Micronesian community members.

***Objective #1: Appraise the EB guidelines for treatment and prevention of hypertension including the DASH.*** Review of literature about traditional Micronesian diet, historical changes in the Micronesian diet, information about the DASH plan developed by the National Heart, Lung, and Blood Institute (2015), and guidelines for applying lifestyle modifications as a health promotional strategy was performed by using the following search engines: PubMed, ProQuest, Google Scholar, CINAHL, and MEDLINE.

***Objective #2: Communication with healthcare professionals and Micronesian community members about a healthy eating plan.*** Communications with healthcare professionals, and Micronesian community members were aimed at collecting information about healthy eating plans and culture-specific approaches for education about healthy dietary choices. Cultural expectations, views on health, illness, and diet were reviewed.

***Objective #3: Develop a modified DASH plan.*** A modified DASH plan was developed by using the reviewed material on the DASH plan, including randomized controlled studies from EB resources, teaching strategies, and information that will be collected during the interviews. The modified plan was simple, easy to follow, and culturally appropriate. The DASH plan was presented as a tri-fold brochure (see Appendix E).

**Aim #2: Test the modified DASH plan by conducting a pilot study and evaluating the effectiveness of the modified DASH plan.**

***Objective # 1: Recruiting a sample of participants during the November Health Fest in Hilo, ask the participants to adhere to the diet plans and to self-record their diet for 2-4 weeks.*** During an annual Health Fest in Hilo, 30 adult Micronesian participants were recruited for a pilot study. The participants were people who applied for health insurance during the open enrollment period. In Hawai'i, the open enrollment period for 2019 ran between November 1, 2018 and

December 15, 2018. Most of the participants needed help with the application process; therefore, they came to the Health Fest 2018. Some participants told me that they came from Micronesia several months ago, and they did not have established medical services. The participants included adult men and women living currently on the Big Island of Hawai'i. Each participant read and completed a consent form (see Appendix B) prior to filling out the survey questions (see Appendix C). The exclusion criteria were non-Micronesian participants of the Health Fest, people who would not be available for post intervention follow-up appointments, or who did not speak English. This was a convenience sample, and participants were recruited whether they have hypertension or not. Each participant was assigned a number from one to 30 to protect their identity. During this first interaction, the participant's blood pressure was checked and recorded. They were asked to answer survey questions (see Appendix C). Each participant received a DASH brochure. The participants were encouraged to look through the DASH brochure and to ask questions about the plan. Each participant received a bag with vegetables from a local KTA store, a DASH brochure (see Appendix E), and a one-page calendar to use as a diet journal (see Appendix D). Vegetables were chosen over a monetary gift certificate because vegetables could be an extra reminder about the project's topic. The bags with vegetables could influence the participants to think about what they might cook when they came home. The types of vegetables were selected after communications with several members of the Micronesian community. The list of the selected vegetables was given to employees of the KTA store in Hilo. The KTA employees were asked to pack locally produced vegetables whenever it was possible. The contacted Micronesians selected the following vegetables: Chinese cabbage, carrots, cucumbers, lettuce, spinach, sweet potato greens, zucchini, squash, and onions. The KTA employees provided bags with a variety of fresh vegetables, which included carrots, onions, zucchini,

cucumbers, cabbage, and lettuce. The cost of vegetables in each bag was ten dollars. The bags were picked up from the store on the morning of the Health Fest day. Vegetables were chosen over fruits. Not knowing the medical history of the participants, it could be possible that some of the participants had diabetes mellitus, and vegetables would be a better choice for them.

The participants were asked their permission to check and record their blood pressure. The same automatic wrist blood pressure cuff was used during the recruitment and follow-up appointments. The wrist blood pressure cuff was used because it could accommodate a wide range of different arm sizes. At the end, participants were asked to write down in their calendars what types of vegetables and fruits they ate during the next two weeks. The participants gave their contact information; therefore, they could be contacted in two weeks and four weeks to schedule follow-up appointments to check their blood pressure and food calendars. Participants were encouraged to consume a variety of different vegetables and fruits.

***Objective #2: Survey the participants in 2 and 4 weeks for feedback, adherence to the diets, assess their post intervention blood pressure.*** In two and in four weeks, the participants were contacted via phone calls and asked for follow-up appointments. During the follow-up appointments, the participants were surveyed (see Appendix C), their blood pressure was checked and recorded, and their food journals were reviewed. The participants were reimbursed with \$25.00 KTA gift cards during each appointment.

***Objective #3: Develop a heart-healthy diet plan based on participants' feedback and changes in blood pressure if the changes have happened.*** According to Juraschek et al. (2017b), DASH diet lowered blood pressure within 2 weeks, and it maintained the blood pressure by week 12. The stage 2 of the study lasted two and four weeks, and changes in blood pressure could be noticed. The means of the changes in blood pressure from baseline to post

intervention were calculated and compared. The adherence to the diets was assessed by looking at the diet journals and surveys. Barriers to adherence to the DASH plan were evaluated.

Modifications to the DASH diet were developed.

All collected data were coded and placed into an Excel Spreadsheet for analysis. The data included: age, gender, established diagnosis of hypertension, health rating, daily consumption of vegetables, daily consumption of processed food, and blood pressure readings. The data was presented in tables and graphs.

### **Protection of Human Studies**

A proposal of this project was reviewed and approved by the Scientific Review Committee at University of Hawaii on September 14, 2018. Then, the proposal was submitted to the University of Hawaii Institutional Review Board. The proposal was approved for human research on November 8, 2018 (see Appendix A).

An informed consent form, containing risks and benefits, was given to each participant (see Appendix B), and all participants were informed about the goal of this project and potential risks. The potential risks included a physical discomfort from blood pressure screening and possible emotional discomfort if participants had elevated blood pressures. All participants with elevated blood pressures were informed that elevated blood pressure did not mean that they had hypertension because elevated blood pressure could be caused by caffeine, medications, physical exercises, smoking, and other reasons. However, the participants with elevated blood pressure were advised to see their primary care providers. Confidentiality of the participants was maintained by providing each participant with a code. During the recruitment, the participants were assigned with codes ranging from 1 to 30. The participants were not identified during presentations and in written materials. Blood pressure readings were matched with codes and

could not be linked to any of the participants. Qualitative information which was recorded during this study was given codes from A to J and was not be identifiable. No ethical concerns were found during this project and up to this point of time.

### **Timeline and Budget**

The budget and timeframe were recorded in the appendixes (see Appendixes H and G).

The study began during the Health Fest in Hilo on November 17, 2018. The first two week follow-up appointments were conducted on December 1 and December 3. The second two week follow-up appointments were conducted on December 15 and December 17. Follow-up appointments were scheduled at either the University Heights Park in Hilo, or at the bookstore at the University of Hawaii in Hilo. The follow-up appointments were stretched to three days each time because of the participants' requests to accommodate their schedules.

## **Chapter 4**

The goal of this study was to develop a culturally appropriate DASH plan to prevent development of hypertension or to manage hypertension among Micronesian populations. The study showed a decrease of blood pressure among most participants with elevated blood pressure. One of the participants reported that his primary care provider was pleased with his blood pressure readings and took him off his antihypertensive medication. Also, his provider recommended continuing eating more vegetables after the project would be over, "It is good for you." Results of this study are discussed in this chapter.

### **Framework Guidance**

The project was based on the HBM. The HBM guided the planning and execution of the project. This model fits interventions which are aimed at prevention of hypertension or treatment of hypertension. If people believe that they are susceptible to having hypertension or they have

already developed hypertension, they may consider steps or actions to modify their risk factors and lifestyle choices. The HBM guided participants through a process: realization of susceptibility to a health condition, acknowledgment the severity of the disease, acceptance of benefits and barriers, and cues to action. All of these steps may not be successful if people have not developed self-efficacy. The modified HBM is presented as a continuing process because not all interventions may be successful from the beginning, and it may take several cycles to achieve long-lasting changes. As people attempt lifestyle modifications, they may fail at some points; however, every attempt should be considered as a road for success. This road may not be straight or short. Therefore, providers should be patient and encouraging when they recommend lifestyle modifications.

### **Data Analysis**

**Characteristics of participants.** The total number of participants was 30. All of them filled out the survey questions (See Appendix B). Participants' age ranged from 20 to 72 years old. The average age was 40.6 years old. Participants included 12 males (40%) and 18 females (60%).

Table 2

*Age of the Participants*

Age	Number of Participants
20-29	6
30-39	10
40-49	4
50-59	8
60-72	2
Total Number of Participants	30

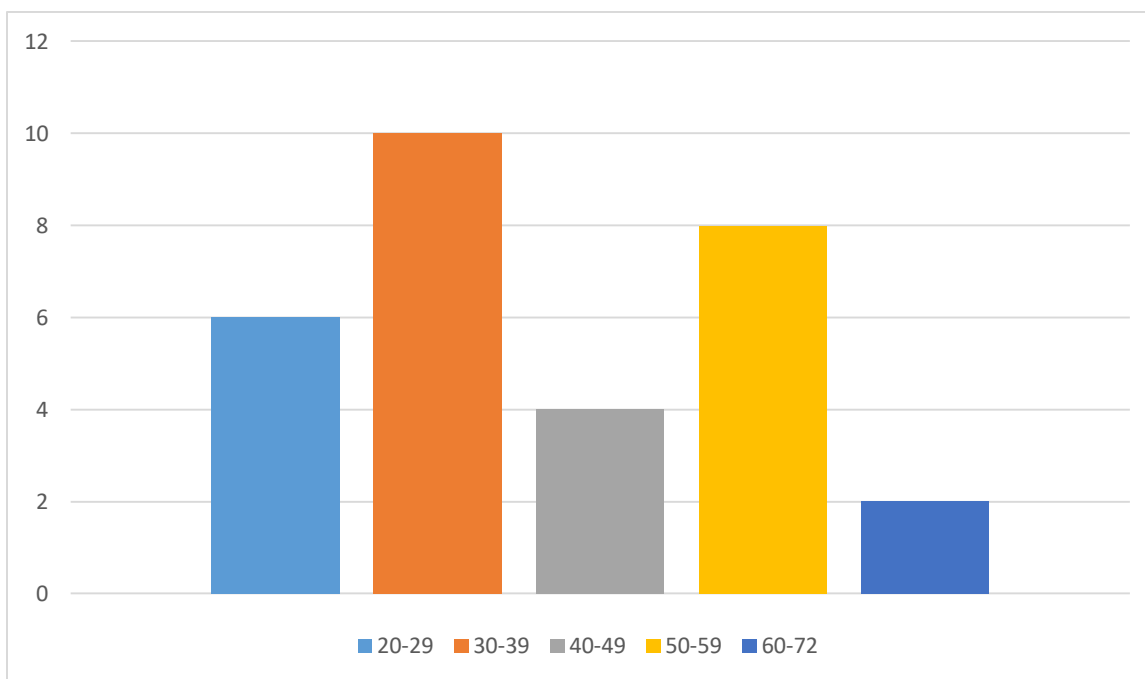
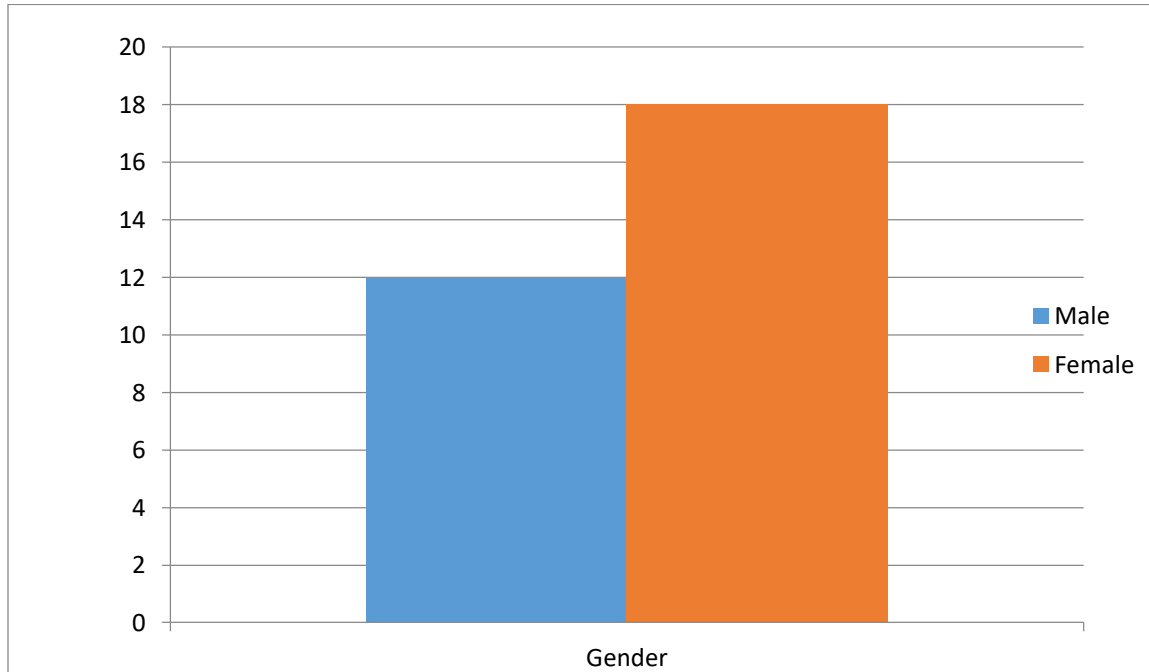


Figure 2. Chart of the participants' age.



*Figure 3.* Chart of the participants' gender.

Answering on a question; “Have you ever been told by a health care professional (medical doctor, nurse practitioner, physician assistant) that you have high blood pressure?,” ten participants marked “High blood pressure,” one participant marked “You do not have high blood pressure, but you are likely to have it in the future,” 19 participants marked “None of the above.” About 30% of the participants were diagnosed with hypertension, and 70% of the participants had not been diagnosed with hypertension. One of the 30 participants was at risk for developing hypertension.

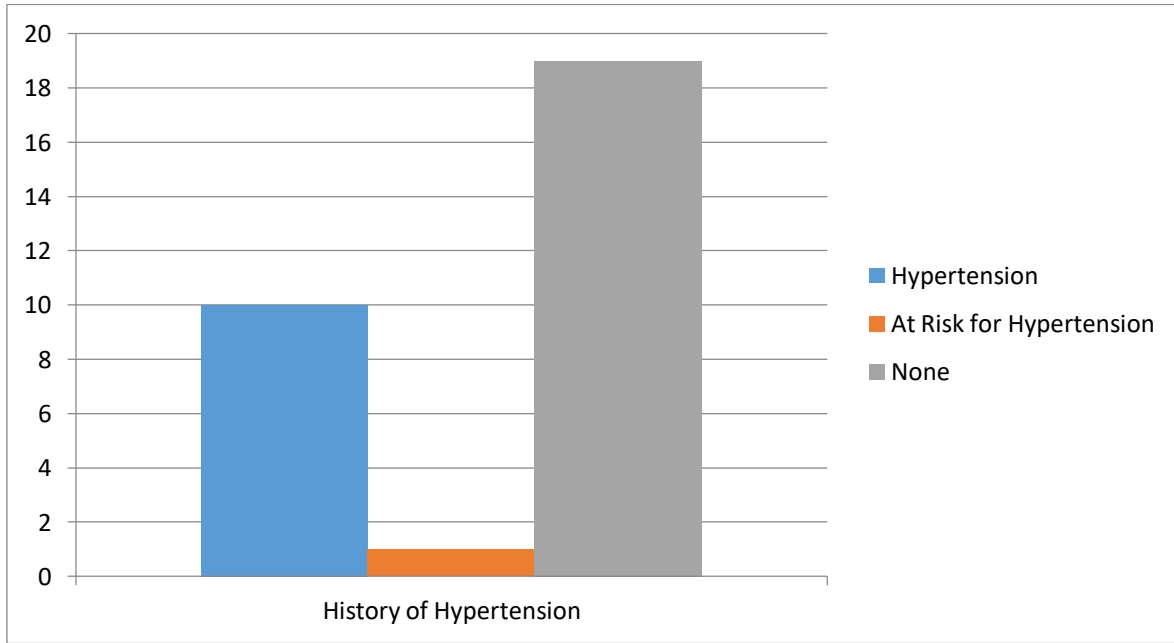


Figure 4. Chart of the participants blood pressure categories on November 17, 2019.

On a question “How would you rate your health?,” five participants (17%) answered “excellent,” 16 participants (53%) answered “good,” eight participants answered “average” (27%), and one participant answered “poor” (see Table 3 and Figure 5). None of the participants marked “very poor.”

Table 3

*Health Ratings*

Health Ratings	Number of Participants
Excellent	5
Good	16
Average	8
Poor	1
Very poor	0

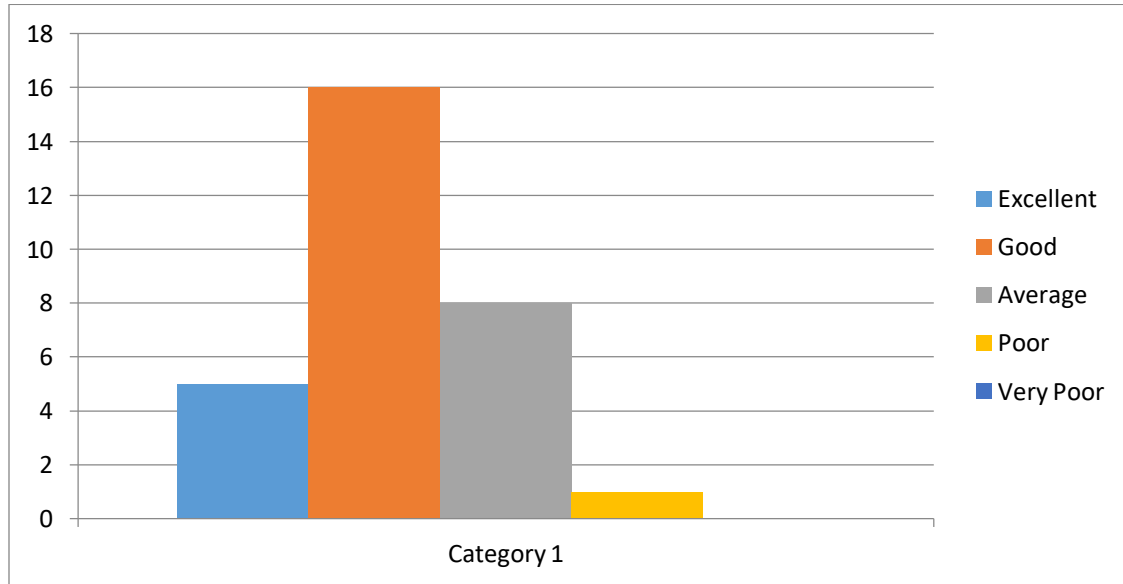


Figure 5. Chart of the participants' health ratings.

Blood pressures were taken prior to implementation of the DASH diet. Seven participants (23%) had a normal blood pressure reading, eight participants (27%) had systolic blood pressure between 120 and 139 mmHg or diastolic blood pressure between 80 and 89 mmHg, and eleven participants (36%) had systolic blood pressure between 140 and 159 mmHg or diastolic blood pressure between 90 and 99 mmHg. Four participants (13%) had systolic blood pressure above 160 mmHg or diastolic blood pressure above 100 mmHg. Looking at this assessment of the participants, 77% of participants had elevated blood pressure readings, and 50% of them had blood pressure readings high enough to be considered hypertension.

Table 4

Blood Pressure Readings During the Recruitment on November 17, 2018.

Blood Pressure	Number of Participants
Normal (Less 120/79)	7
Prehypertension (Between 120/80 and 139/89)	8
Hypertension, Stage 1 (Between 140/90 and 159/99)	11
Hypertension, Stage 2 (Above 160/100)	4

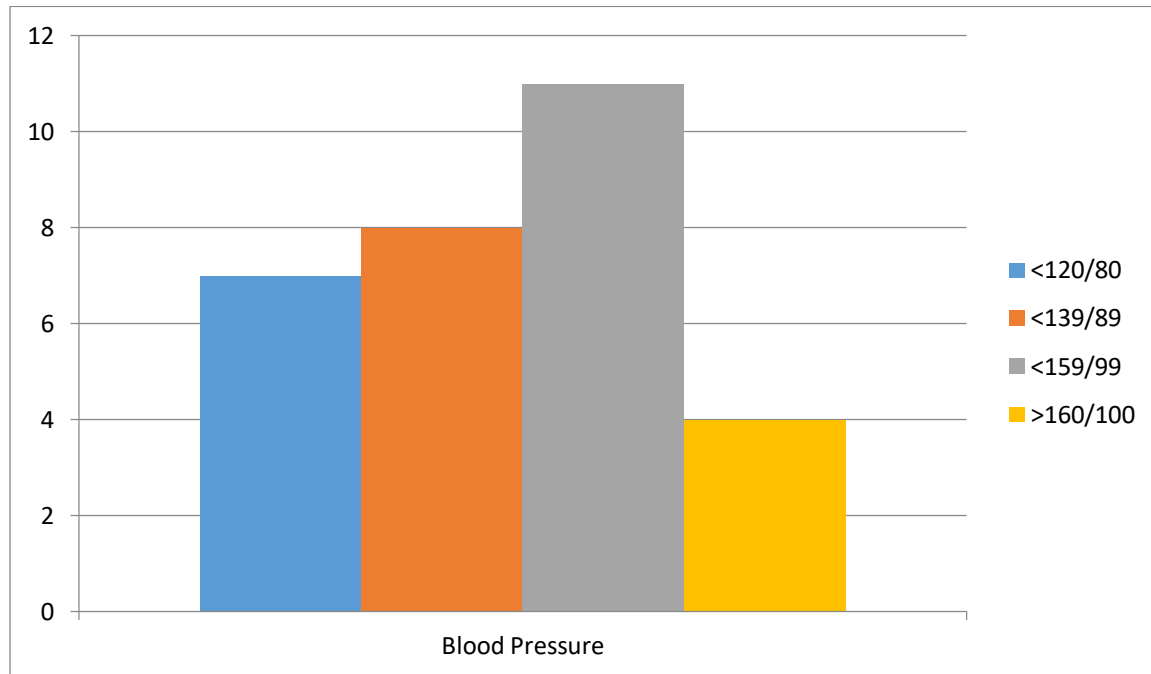


Figure 6. Chart of blood pressure categories during recruitment on November 17, 2018.

Twelve participants were able to return for a follow-up appointment two weeks after the recruitment date. All 30 people were contacted via phone numbers, which were provided by the participants, one and two days prior to the scheduled appointment. Not all participants were reached over the phone. Some phone numbers were disconnected, some could not accept messages, and some participants left the Big Island. To accommodate the schedules of the participants, two meeting dates were arranged: December 1 and December 3.

Blood pressure was measured during the first two-week follow-up appointment. Four participants' blood pressure remained in the same categories as two weeks ago: "Normal" (less than 120/80 mmHg) (3 participants) or "Prehypertension" (between 120/80 and 139/89 mmHg) (1 participant) (see Table 4). Eight participants (67 %) had a reduction in their blood pressure category, and none of the participants had a blood pressure in the category "Hypertension, Stage 2" (above 160/100 mmHg). One participant had blood pressure in the category "Hypertension, Stage 1" (between 140/90 mmHg and 159/99 mmHg). Three participants had their blood

pressure in the category “Prehypertension” (between 120/80 mmHg and 139/89 mmHg). Four participants who had elevated blood pressure during the initial encounter had normal blood pressure readings during the two-week follow-up appointment.

Table 5

*Changes in the Blood Pressure after Two Weeks (12 participants)*

Blood Pressure Categories	History of Hypertension	November 17, 2018	December 1-December 3, 2018
Normal	6	3	6
Prehypertension	1	3	5
Hypertension, Stage 1	5 (stage 1 and 2)	4	1
Hypertension, Stage 2		2	0

The participants who had normal blood pressure continued having normal blood pressure readings after two weeks of participation in the study. The participants who had “prehypertension” had systolic blood pressure reduced by 13 mmHg (see Table 6 and Figure 7). The participants who had “hypertension, stage 1” had systolic blood pressure reduced by 23.8 mmHg. The participants who had “hypertension, stage 2” had mean systolic blood pressure reduced by 27.5 mmHg. The mean systolic blood pressure was reduced by 21 mmHg when participants who had prehypertension, hypertension, stage 1 and stage 2 were included.

Table 6

*Changes in Systolic Blood Pressure After Two Weeks*

Blood Pressure Readings	Number of participants
Systolic blood pressure decreased by 10 mmHg or less	2
Systolic blood pressure decreased by 11-20 mmHg	3
Systolic blood pressure decreased by more than 21 mmHg	3
Systolic blood pressure did not change	1
Systolic blood pressure increased by 10 mmHg or less	3
Systolic blood pressure increased by 11-20 mmHg	0
Systolic blood pressure increased by more than 21 mmHg	0

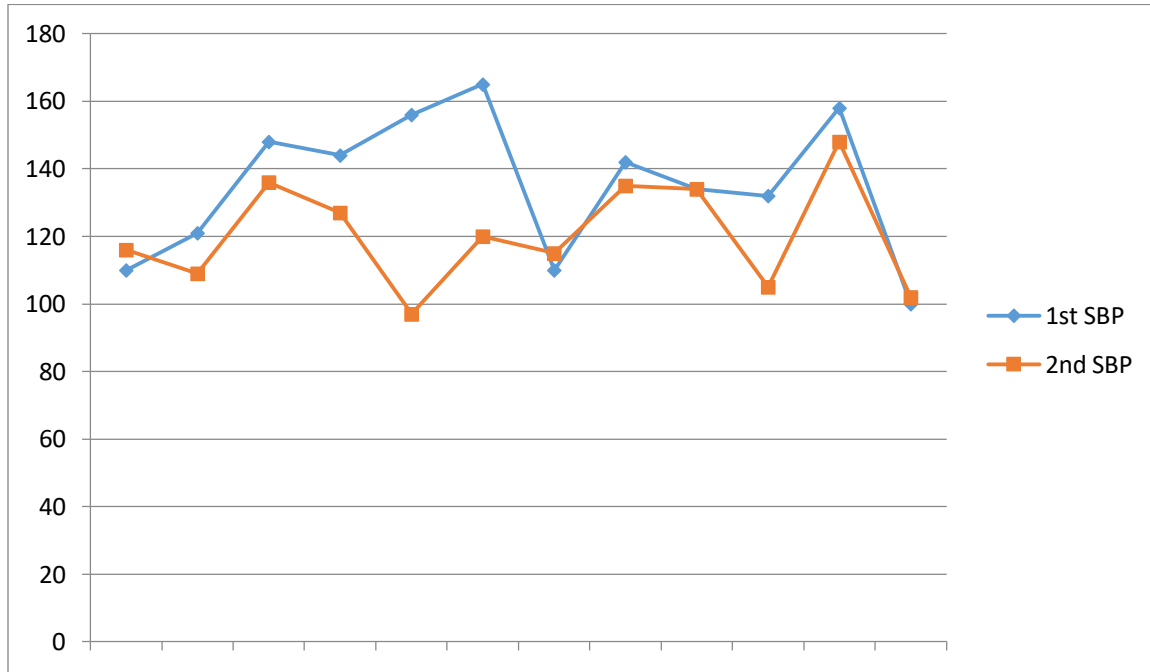


Figure 7. Chart of systolic blood pressure during recruitment and in two-week follow-up. 1st SBP = The first systolic blood pressure reading during the recruitment on November 17, 2019. 2nd SBP = The second systolic blood pressure reading during the first follow-up on December 1-December 2, 2019.

The participants’ average diastolic blood pressure was reduced by 17 mmHg among the participants in the categories: “prehypertension,” “hypertension, stage 1,” and “hypertension, stage 2.” One participant had an increase in the diastolic blood pressure by 9 mmHg, and one participant had a decrease by 57 mmHg (see Table 7 and Figure 8). The participants who had normal diastolic blood pressure readings continued having normal readings in two week follow-up appointment.

Table 7

*Changes in Diastolic Blood Pressure After Two Weeks*

Diastolic blood pressure decreased by 10 mmHg or less	2
Diastolic blood pressure decreased by 11-15 mmHg	3
Diastolic blood pressure decreased by 16-20 mmHg	3
Diastolic blood pressure decreased by 21 mmHg or more	1
Diastolic blood did not change	0
Diastolic blood pressure increased by 10 mmHg or less	3
Diastolic blood pressure increased by 11 mmHg or more	0

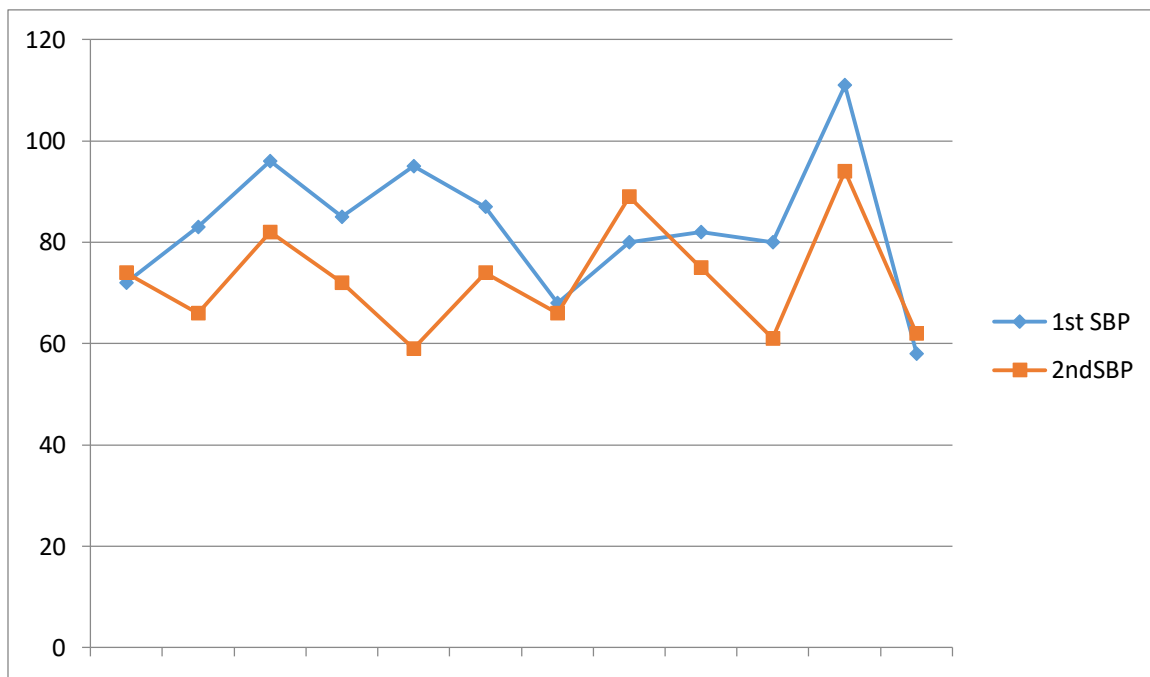


Figure 8. Chart of the changes in the diastolic blood pressure readings during the first two weeks.

Fourteen participants returned for the second follow-up appointment on December 15 and December 17, 2018. During the second follow-up appointment, two participants had “hypertension, stage 1” (see Table 8). The rest of the participants had blood pressure readings in

the following categories: “normal” and “prehypertension.” Overall, there was an improvement in blood pressure readings after four weeks of the study.

Table 8

*Changes in the Blood Pressure Readings After Four Weeks (14 participants)*

Blood Pressure Categories	History of Hypertension	November 17, 2018	December 15-December 17, 2018
Normal	7	3	7
Prehypertension	1	4	5
Hypertension, Stage 1	6 (stage 1 and 2)	5	2
Hypertension, Stage 2		2	0

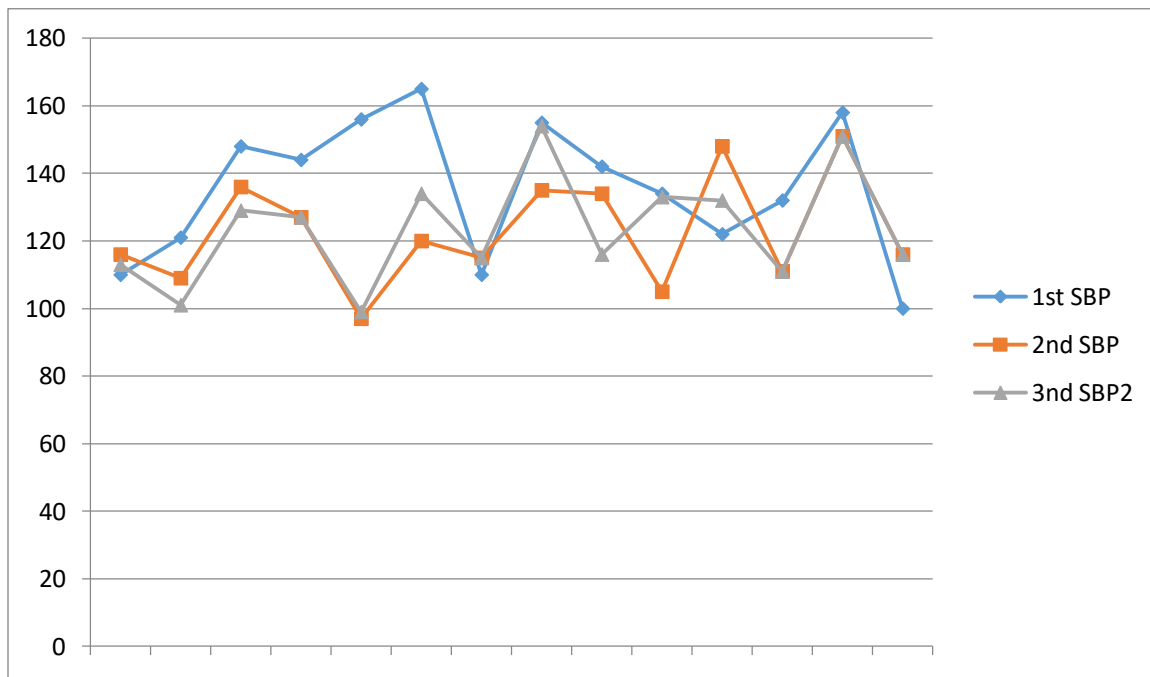


Figure 9. Chart of the changes in the systolic blood pressure readings in four weeks.

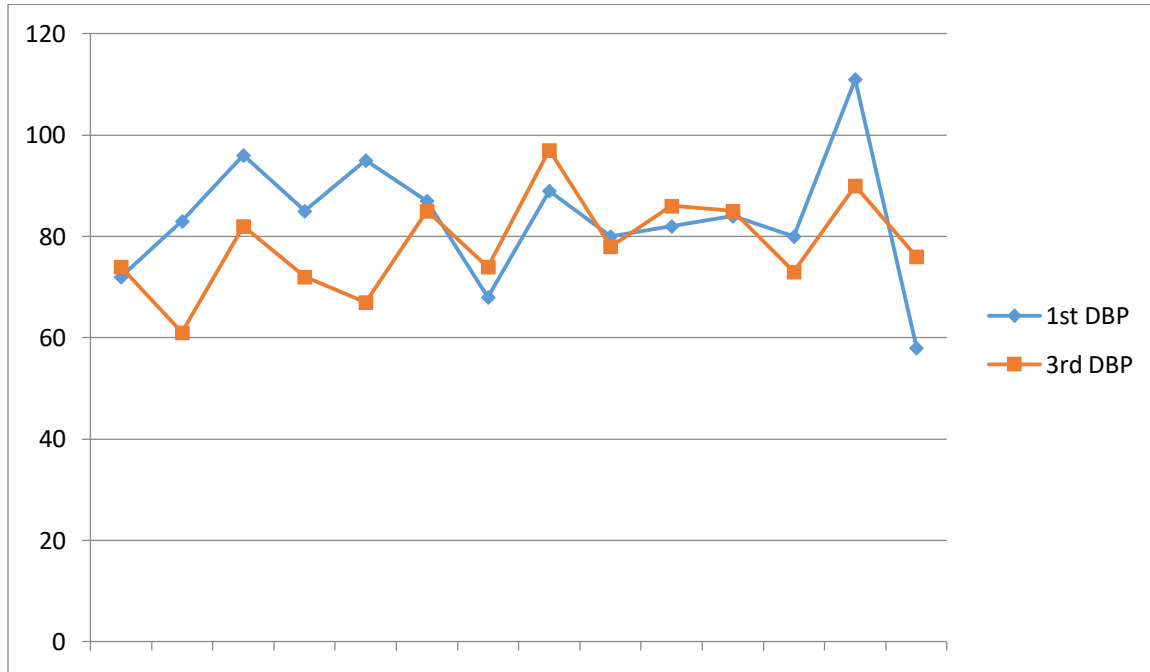


Figure 10. Chart of the changes in the diastolic blood pressure readings in four weeks.

After four weeks of the study, 71% of participants had a decrease in the systolic blood pressure, and 29 % of participants had an increase in the systolic blood pressure readings (see Table 9). The increase in the systolic blood pressure readings was among the participants who were in the categories: “normal” and “prehypertension.” Among people with hypertension, stage 1 and 2, the average systolic blood pressure was 152.6 mmHg during the recruitment and 133.7 mmHg in four weeks. The average systolic blood pressure reduced by 18.9 mmHg; the systolic blood pressure reduced by 12 %. The results show that people from the category “hypertension, stage 1” and “hypertension, stage 2” had a significant reduction in the systolic blood pressure.

Table 9

*Changes in Systolic Blood Pressure Readings After Four Weeks*

Systolic Blood Pressure Changes	Number of Participants
Systolic blood pressure decreased by 10 mmHg or less	3
Systolic blood pressure decreased by 11-20 mmHg	3
Systolic blood pressure decreased by more than 21 mmHg	4
Systolic blood pressure did not change	0
Systolic blood pressure increased by 10 mmHg or less	3
Systolic blood pressure increased by 11-20 mmHg	1
Systolic blood pressure increased by more than 21 mmHg	0

The participants' diastolic blood pressure reduced as well, especially among people who had their initial diastolic blood pressure in the categories: "hypertension, stage 1" and "hypertension, stage 2." During the recruitment, the average diastolic blood pressure among them was 91.9 mmHg. In four weeks, the diastolic blood pressure was 81.6 mmHg (see Table 10). The mean diastolic blood pressure reduced by 10.3 mmHg or 11.2 %.

The average diastolic blood pressure was 82 mmHg among the participants with prehypertension during recruitment. In four weeks, their diastolic blood pressure reduced to 76 mmHg. It was 6 mmHg (7 %) lower than before they were introduced to this project.

This project showed that by increasing amount of vegetables and decreasing amount of processed food in the diet, systolic and diastolic blood pressure could be reduced among people with elevated blood pressure.

Table 10

*Changes in Diastolic Blood Pressure Readings After Four Weeks*

Diastolic Blood Pressure Changes	Number of Participants
Diastolic blood pressure decreased by 10 mmHg or less	4
Diastolic blood pressure decreased by 11-15 mmHg	2
Diastolic blood pressure decreased by 16-20 mmHg	0
Diastolic blood pressure decreased by 21 mmHg or more	3
Diastolic blood did not change	0
Diastolic blood pressure increased by 10 mmHg or less	4
Diastolic blood pressure increased by 11 mmHg or more	1

On the survey’s inquiry about daily consumption of fresh vegetables (I eat fresh vegetables 4 times every day), two participants (7%) answered “strongly agree,” ten (33%) answered “agree,” eight (27%) answered “neutral,” ten (33%) answered “disagree.” None of the participants reported “strongly disagree.”

Table 11

*Frequency of Consumption of Fresh Vegetables*

Consumption of Vegetables (4 times/day)	Number of Participants
Strongly agree	2
Agree	10
Neutral	8
Disagree	10
Strongly Disagree	0

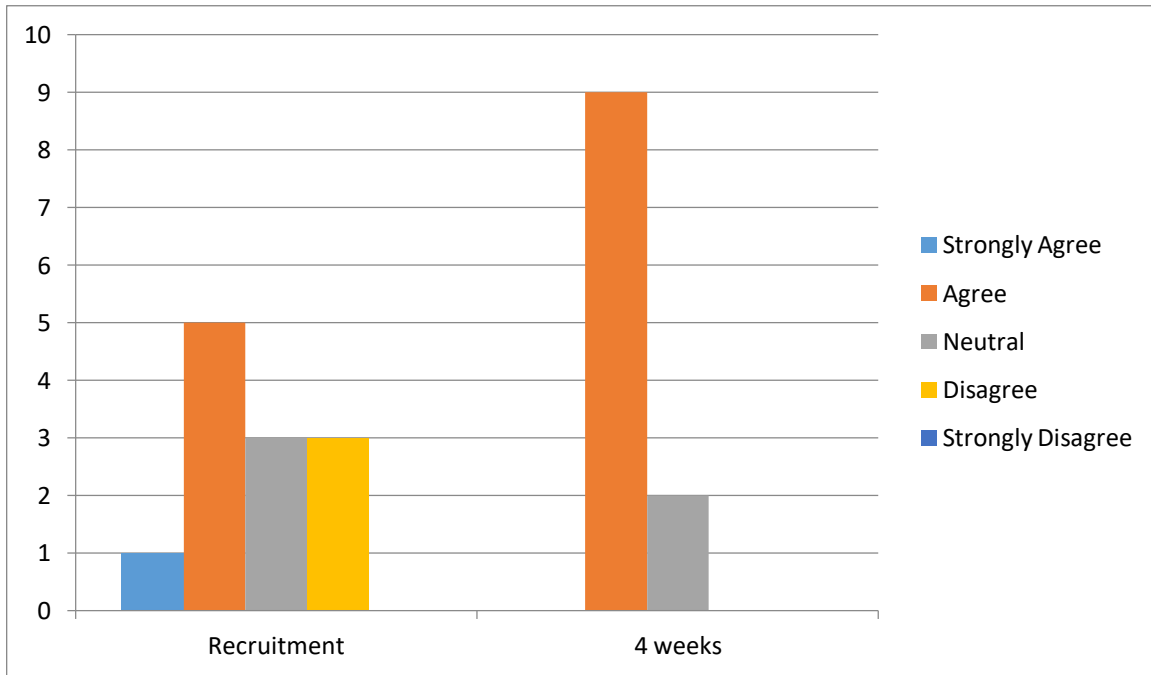


Figure 11. Chart of frequency of consumption of fresh vegetables.

After four weeks of the project, 14 participants responded to the same survey questions (see Appendix C). Five participants (36 %) reported increased consumption of vegetables, eight participants (57 %) reported no changes with the amount of consumed vegetables, and one participant (7 %) reported decreased consumption of vegetables when results were compared with the previous surveys' results. The results show that about one in three participants increased intake of vegetables. One of the participants decreased consumption of vegetables. It is possible to assume that this participant recording his or her consumption of vegetables in the calendar began to realize that he or she did not eat as much vegetables as he or she had thought previously. Therefore, during the follow-up appointments, the participants might answer on the survey's questions more realistically. Several participants reported that they could not eat vegetables every day because they did not have any vegetables at home every day. A participant who recorded daily consumption of vegetables and fruits stated that when he looked at his calendar, and he saw that he did not eat any vegetables that day, he would make an effort to eat

vegetables for dinner. Participants wrote the following in the comments about their consumption of vegetables and barriers to eating vegetables that they had: “I actually eat vegetables twice daily,” “Wheat bread, eggs with vegetables, carrots,” “Don’t always have vegetables,” “Not always,” “Sometimes I don’t have vegetables,” “I keep my blood pressure good,” “Trying,” “This study makes me more conscious about including vegetables and fruits in my diet,” and “I usually eat cabbage and mostly onion because we always use it to mix with meat.”

Twelve people brought back food intake calendars. Four out of the 12 participants listed almost daily consumption of vegetables. Four participants (33%) left their calendars either blank or without any records for more than seven out of 14 days. This could mean that participants either did not eat vegetables daily, or they did not record their vegetable consumption. The most popular vegetables were: cabbage, carrots, cucumbers, lettuce, onions, and broccoli. Four participants reported eating traditional vegetables: breadfruit and taro. One of the participants mentioned that breadfruit is not a fast food item, and it takes some time to process and cook breadfruit. The same participant stated that he did not eat vegetables daily because he resided infrequently at home. He did not want to buy vegetables because they would be spoiled by the time he would return home. Several participants asked if breadfruit, potatoes and onions are considered to be vegetables. It is possible that some participants did not record all the consumed vegetables because they did not consider some starchy vegetables as vegetables. Therefore, in future studies, clear explanations and examples of vegetables should be provided to participants.

Table 12

*Types of Vegetables Consumed During the Four Weeks*

Vegetables	Number of Participants
Cabbage	8
Carrots	7
Cucumber	7
Onions	7
Broccoli	6
Cucumber	5
Lettuce	5
Potatoes (including sweet potatoes)	5
Breadfruit	4
Tomatoes	4
Taro	2
Avocado, bell peppers, eggplant, celery, corn, mushrooms, peas, spinach, sprouts, zucchini, mix of frozen vegetables	1-2

Table 13

*Types of Fruits Consumed During the Four Weeks*

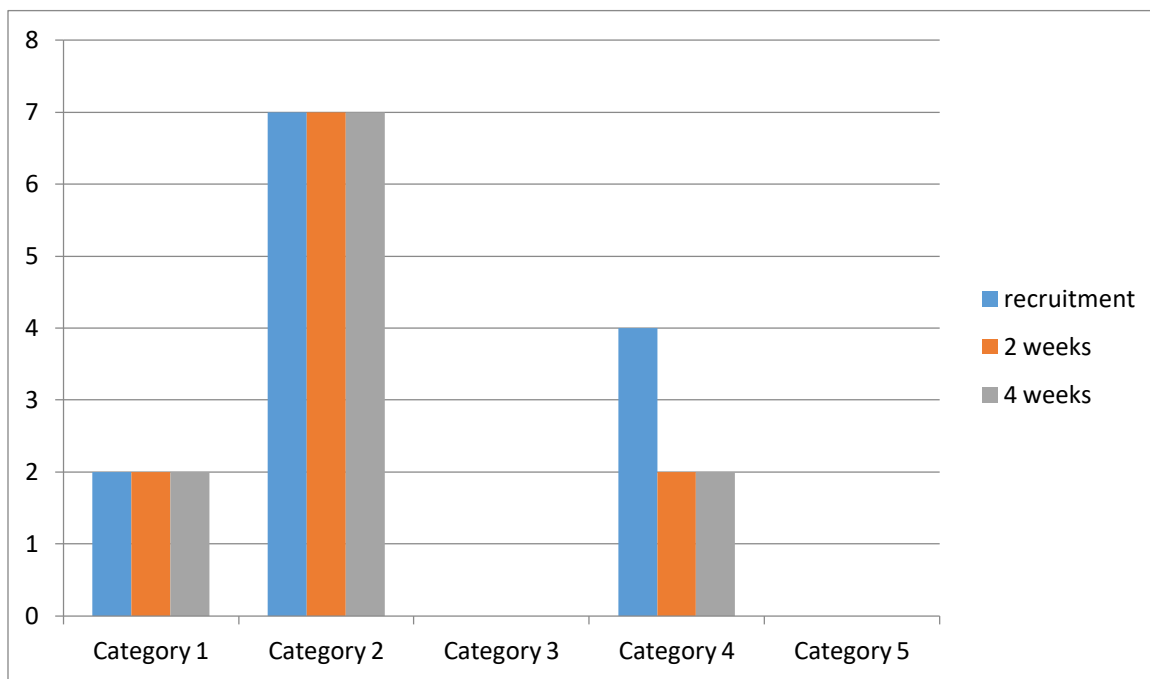
Fruits	Number of Participants
Banana	9
Apple	5
Oranges	5
Papaya	5
Watermelon	4
Mango	3
Cantaloupe, grapes, kiwi, pandanus, peaches, pears, pineapple, strawberry	1-2

On the survey's inquiry about daily consumption of processed food (I eat processed food less than 3 times every day), two participants (14%) answered "strongly agree," seven (50%) answered "agree," two (14%) answered "neutral," three (21%) answered "disagree," and none answered "strongly disagree" (See Table 14).

Table 14

*Frequency of Consumption of Processed Food*

Consumption of Processed Food (Less than 3 times/ day)	Number of Participants
Strongly agree	2
Agree	7
Neutral	2
Disagree	3
Strongly Disagree	0



*Figure 12.* Chart of frequency of consumption of processed food during recruitment, in two weeks, and in four weeks. Responses on the survey’s statement, “I eat processed food less than 3 times every days:” Category 1 = strongly agree; Category 2 = agree; Category 3 = neutral; Category 4 = disagree; Category 5 = strongly disagree.

Five participants (36%) reported no changes with consumption of processed food and six participants (43%) decreased their consumption of processed food. Three participants (21%) reported increased their consumption of processed food. The significant decrease in consumption

of processed food could mean that participants became more aware of what they ate daily. Some of the participants commented about their consumption of processed food (see Table 15).

Table 15

*Comments of Participants on Consumption of Processed Foods*

I have more vegetables and minimize fatty food
I don't eat processed food
Wheat bread, applesauce, coffee, chicken, tuna in water
I eat processed food almost every day
I sometimes don't have a choice
Fat food I would start eat less and eat more veggie and fruit
It is very hard not to eat processed food for lunch but I try to bring left over dinner
I usually eat canned meat and chips
Sometimes I ate a handful of sugary or salty unhealthy snacks. Eat less of starchy food, increase servings of veggies and try to stay away from processed food
I don't eat processed food anymore. Wife looks after my diet.
Still trying to get rid of processed food from my diet
Eat less fat food and eat more healthy food
I think I want to reduce eat [eating] canne [canned] meat
I usually eat can meat such as spam, mackerel, tuna, and corn beef

It seems that some participants include wheat bread and coffee in the processed food category. There are noticeable barriers in overcoming the consumption of processed food. For example, healthier food is not always available, especially when participants are away from home. However, one of the participants brings leftover food from home instead of buying unhealthy meals during lunch. Participants were aware about healthier dietary choices; they acknowledged that eating more vegetables would benefit their health. Also, the participants knew that processed food was unhealthy, and they made efforts to reduce the amount of fatty and processed food in their diet.

**Chapter 5**

**Recommendations and Conclusions**

This project was designed to evaluate how implementation of the DASH plan could affect blood pressure among Micronesian participants. Several factors contributed to the results of this project: high prevalence of hypertension among participants (30%) which was acknowledged by participants, perceived benefits of adding vegetables in the diet, and numerous barriers to healthy dietary choices. Other factors which may contribute to poor control over blood pressure were not considered in this project: regular and consistent access to healthcare services, adherence to medications, and engagement in physical activity. Self-efficacy in managing hypertension was promoted by encouraging dietary changes, providing simple recommendations and supporting small changes such as adding vegetables and fruits in the diet through the “Add vegetables to every meal” slogan. Though this project could not address all potential problems of hypertension management, the DASH plan helped to promote healthy choices in diet. On average, systolic blood pressure reduced by 18.9 mmHg; mean diastolic blood pressure reduced by 10.3 mmHg among people in the categories: “hypertension, stage 1” and “hypertension, stage 2. The results of this project supported findings from several studies. For example, the project’s findings were similar to the DASH effects reported by Appel et al. (1997); systolic and diastolic blood pressure reduced more among people with elevated blood pressure than in the participants with normal blood pressure.

### **Strengths and Barriers**

About 30% of the participants reported having a diagnosis of hypertension, and 50% of the participants had blood pressure readings high enough to meet classifications for hypertension stage 1 or stage 2. Besides hypertension, other factors may influence increase in blood pressure among participants during recruitment, including anxiety and stress of signing and obtaining a health insurance during the Health Fest. Though stress could temporally increase blood pressure,

self-reports of having hypertension show high prevalence of hypertension among Micronesian adults. Hagiwara et al. (2015) wrote that Micronesians encounter numerous barriers to access health care, rely on Med-QUEST, and select plans with high copayment and deductibles through Hawaii Health Connector. During the Health Fest event volunteers helped Micronesians to select and sign for health insurance plans. Observations from that event collaborated information received from the literature review. Micronesians had limited and episodic access to healthcare services.

From this project, several lessons were learned. The first lesson was related to difficulties in contacting participants for follow-up appointments. Several of them either provided wrong or disconnected phone numbers, or their voice messages were full and could not accept any messages. Two participants left the island. The second lesson was that participants were eager to participate in the project initially; however, only 33% of the participants wrote that they had daily consumption of fruits and vegetables and brought their food calendars to appointments. Thirty six percent reported an increase in vegetable consumption. This could mean low adherence (36%) to the DASH plan. Though this project did not emphasize the reduction of processed food; however, 43% of the participants reduced their consumption of processed foods. The third lesson was that participants were well-informed about healthy dietary choices. In their comments, participants wrote about their desire to improve their diet, consume less rice, processed food, and to increase amount of vegetables in their diet. The fourth lesson was that participants had challenges which prevented them from eating healthier. Some of the challenges included the following: “It is very hard not to eat processed food for lunch...,” “I usually eat canned meat and chips,” “I eat processed food almost every day,” and “I sometimes don’t have a choice.”

These lessons reflect the concepts of the Health Belief Model. The participants knew about hypertension, and some of them were diagnosed with hypertension. They knew benefits of vegetables and fruits in their diet and harm of processed foods. They also identified the barriers to dietary changes. Support and encouragement to continue healthy dietary changes may improve self-esteem and adherence to the DASH diet. The expression “Add vegetables to every meal” could simplify dietary teaching and improve adherence to the DASH after this project was over.

Another important objective was found during this project. This project collected information about food preferences among Micronesians living on the Big Island of Hawai'i. This knowledge may help to develop specific recommendations for diet changes.

This project had limitations which could confound the results. No food was provided to participants, except for the initial food bag; participants had complete control over their dietary choices. Blood pressure could be falsely elevated due to stress and other reasons unrelated to hypertension, and participants were not asked if they took any antihypertensive medications or any other drugs. Participants were not asked about behaviors which could influence blood pressure readings such as smoking cigarettes, taking illicit drugs, and participating in physical activities. Another limitation was that only about 50% of the recruited participants returned for follow-up assessments. Duration of the project was four weeks; therefore, adherence to the DASH diet and long-term blood pressure control could not be established.

## **Chapter 6**

### **Implications for Practice**

This project may help in development of future health-promoting projects. It is important to be familiar with cultural expectations, collaborate with Micronesian community and be mindful about different approaches to treat hypertension. As supported by Collier et al. (2018),

in order to achieve acceptance of a new program, community members should be involved in health promotion projects. This project was supported by the members of the Micronesians United-Big Island who provided emic perspective and shared knowledge about different types of foods and lifestyles.

Though it could be difficult to convince “healthy-feeling” adults with hypertension or at risk for hypertension to modify lifestyles and to implement new dietary approaches, teaching about healthier diet is important and necessary. Self-efficacy is a modifiable behavior, and it could be targeted in future projects aimed at enhancing adherence to the DASH plan and providing patient motivation. Healthcare providers may utilize findings from this project and use “Add vegetables to every meal” approach, or they may develop new projects which will engage community, help to set realistic goals, and improve adherence to the DASH plan. Based on this project, recommendations and dietary teaching could be developed. This project resulted in improvement in blood pressure among most of the participants in just four weeks.

Implementation of this culturally congruent DASH plan and other simple to follow plans may improve blood pressure control over longer periods of time.

Future projects may find and develop culturally specific interventions. For example, the participants of this project preferred white rice, and it would be inappropriate to insist on eating brown rice. However, it could be more acceptable to mix brown and white rice together. Therefore, future projects may utilize cultural advisers and interpreters to learn more about barriers, socially appropriate behaviors, and cultural relevance of the dietary changes. Limited access to inexpensive vegetables and fruits is one of the biggest barriers which people identified during this project. Other barriers included a newly developed culture of consumption of unhealthy snacks, high-energy drinks, and low-nutritional value foods. Addressing these and

other barriers in future projects may help in development of affective teaching tools or programs which may improve adherence to the DASH plan, prevent development of hypertension, and reduce blood pressure among Micronesians with hypertension.

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## Appendix A

### Notice of Approval for Human Research



UNIVERSITY  
of HAWAII®  
SYSTEM

Office of Research Compliance  
Human Studies Program

**TO:** Van Hoose, Diane, PhD, University of Hawaii at Hilo, School of Nursing  
Daub, Katharyn, PhD, University of Hawaii at Hilo, School of Nursing, Pagan, Joan,  
University of Hawaii at Hilo, School of Nursing, Nadeau, Gulnara, BSN, University of  
Hawaii at Hilo, School of Nursing

**FROM:** Rivera, Victoria, Dir, Ofc of Rsch Compliance, Biomedical IRB

**PROTOCOL TITLE:** Modifying DASH and Improving Dietary Habits to Reduce Hypertension Among  
Micronesian Populations in Hawaii

**FUNDING SOURCE:**

**PROTOCOL NUMBER:** 2018-00795

**APPROVAL PERIOD:** Approval Date: November 08, 2018      Expiration Date: November 07, 2019

#### NOTICE OF APPROVAL FOR HUMAN RESEARCH

Under an expedited review procedure, the research project identified above was approved for one year on November 08, 2018 by the University of Hawaii Institutional Review Board (UH IRB). The application qualified for expedited review under CFR 46.110 and 21 CFR 56.110, Category 4, 7a.

This memorandum is your record of the IRB approval of this study. Please maintain it with your study records.

The UH IRB approval for this project will expire on November 07, 2019. If you expect your project to continue beyond this date, you must submit an application for renewal of this Human Studies Program approval. The Human Studies Program approval must be maintained for the entire term of your project.

If, during the course of your project, you intend to make changes to this study, you must obtain approval from the Human Studies Program prior to implementing any changes. If an Unanticipated Problem occurs during the course of the study, you must notify the Human Studies Program within 24 hours of knowledge of the problem. A formal report must be submitted to the Human Studies Program within 10 days. The definition of "Unanticipated Problem" may be found at the HSP Policies & Guidance website, [www.hawaii.edu/researchcompliance/policies-guidance](http://www.hawaii.edu/researchcompliance/policies-guidance), and the report form may be downloaded from the website [www.hawaii.edu/researchcompliance/report-protocol-violation-or-unanticipated-problem](http://www.hawaii.edu/researchcompliance/report-protocol-violation-or-unanticipated-problem).

You are required to maintain complete records pertaining to the use of humans as participants in your research. This includes all information or materials conveyed to and received from participants as well as signed consent forms, data, analyses, and results. These records must be maintained for at least three years following project completion or termination, and they are subject to inspection and review by the Human Studies Program and other authorized agencies.

Please notify this office when your project is complete. Upon notification, we will close our files pertaining to your project. Reactivation of the Human

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## **Appendix B**

### Informed Consent for Participation

Aloha! You are being asked to participate in a research study conducted by Gulnara Nadeau, DNP Student from the School of Nursing the University of Hawai'i. The results of this study will contribute to my Practice Inquiry Project.

#### ***What am I being asked to do?***

If you participate in this project, you will be asked to follow the Dietary Approaches to Stop Hypertension (DASH) plan, keep records of your food intake for 2 to 4 weeks, and provide your blood pressure prior to participation in the DASH plan, and in 2 weeks, and in 4 weeks.

#### ***Taking part in this study is your choice.***

You can choose to take part or you can choose not to take part in this study. You also can change your mind at any time. If you stop being in the study, there will be no penalty or loss to you.

#### ***Why is this study being done?***

The purpose of my project is to develop a modified DASH diet that would fit to cultural expectations of Micronesians of the Big Island of Hawai'i. I am asking you to participate because you might help to develop a dietary plan. This plan may help Micronesians with high blood pressure to reduce their blood pressure or prevent high blood pressure in Micronesians who do not have high blood pressure.

***What will happen if I decide to take part in this study?***

If you decide to participate in this study, you will be asked to do the following: first, your blood pressure will be recorded, and you will be asked to fill out a short survey, follow the DASH diet for 2 weeks, and record vegetables and fruits which you will eat in a diet journal. Second, in 2 weeks, you will be asked to return for blood pressure screening, and to bring your diet journal. During this meeting, you will be asked to fill out-a short survey about the DASH plan experience. Your first participation will take 15 to 20 minutes. Your second participation will take 15-20 minutes plus the time that you need to write your daily diet in the journal for 2 weeks. Only you and I will be present during blood pressure screening and filling out surveys. You will be one of about 30 people in this study. You may choose to return in another 2 weeks for the same evaluation of your blood pressure and your diet journal review.

***What are the risks and benefits of taking part in this study?***

The DASH plan is recommended by many reputable health organizations including the American Heart Association. There is no significant physical or psychological risk to participation. You will have a complete control of what types of food you will eat.

***Results of Research:***

The research results will be available upon request to all participants.

***Privacy and Confidentiality:***

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law.

Confidentiality will be maintained by means of codes that could be only known by the researcher, and no names or identifiable information will be used in the study or in the final Practice Inquiry Project. The data will be kept on a computer that is used only by the researcher, and access to the computer will be secured by a password. All surveys and dietary journals will be stored for 3 years in a locked cabinet, and will be destroyed by shredding in 3 years.

Other agencies that have legal permission have the right to review research records. The University of Hawai'i Human Studies Program has the right to review research records for this study. When I report the results of my research project, I will not use your name. I will not use any other personal identifying information that can identify you. I will use pseudonyms (fake names) and report my findings in a way that protects your privacy and confidentiality to the extent allowed by law.

***Future Research Studies:***

Even after removing identifiers, the data from this study collected for this study will not be used or distributed for future research studies.

***Compensation:***

You will receive a bag with vegetables from a local grocery store for the initial survey and blood pressure assessment, and \$25 gift card to a grocery store after you participate in a diet intervention: writing your daily diet in a journal, meeting with me to assess your blood pressure after 2 weeks, and filling out the same survey. If you choose to participate in diet intervention during another 2 weeks, you will receive another \$25 gift card.

**Questions:** If you have any questions about this study, please email me [nadeau7@hawaii.edu](mailto:nadeau7@hawaii.edu).

You may contact my advisor Dr. Diane Van Hoose at [dianev@hawaii.edu](mailto:dianev@hawaii.edu) You may contact the UH Human Studies Program at 808.956.5007 or [uhirb@hawaii.edu](mailto:uhirb@hawaii.edu) to discuss problems, concerns and questions; obtain information; or offer input with an informed individual who is unaffiliated with the specific research protocol. Please visit <http://go.hawaii.edu/jRd> for more information on your rights as a research participant.

If you agree to participate in this project, please sign and date the following signature page and return it to:

Keep a copy of the informed consent for your records and reference.

**Signature(s) for Consent:**

I give permission to join the research project entitled, "*Modifying the DASH Diet and Improving Dietary Habits to Reduce Hypertension Among Micronesian Populations in Hawai'i.*"

**Name of Participant (Print):** \_\_\_\_\_

**Participant's Signature:** \_\_\_\_\_

**Signature of the Person Obtaining Consent:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Appendix C**  
Survey Questions

1. How old are you? \_\_\_\_\_
2. What is your gender?
  - Male
  - Female
  - Other
3. Check all that apply. Have you ever been told by a health professional (medical doctor, nurse practitioner, physician assistant) that you have:
  - High blood pressure
  - You do not have high blood pressure, but you are likely to have it in future
  - None of the above

4. How would you rate your health?

Excellent \_\_\_\_\_ Good \_\_\_\_\_ Average \_\_\_\_\_ Poor \_\_\_\_\_ Very Poor

Comments \_\_\_\_\_  
\_\_\_\_\_

5. I eat fresh vegetables at least 4 times every day.

Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
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Comments \_\_\_\_\_  
\_\_\_\_\_

6. I eat processed food less than 3 times every day. Examples of the processed food: spam, canned meat, hotdogs, bacon strips, and potato chips.

Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
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Comments \_\_\_\_\_  
\_\_\_\_\_

7. What would you change in the dietary guide?

Comments \_\_\_\_\_  
\_\_\_\_\_

**Appendix D**

Dietary Journal

**November/ December 2018**

<b>18/ Sunday</b> Vegetables  Fruits	<b>19/Monday</b> Vegetables  Fruits	<b>20/Tues</b> Vegetables  Fruits	<b>21/Wed</b> Vegetables  Fruits	<b>22/Thursday</b> Vegetables  Fruits	<b>23/Friday</b> Vegetables  Fruits	<b>24/Saturday</b> Vegetables  Fruits
<b>25/ Sunday</b> Vegetables  Fruits	<b>26/Monday</b> Vegetables  Fruits	<b>27/Tues</b> Vegetables  Fruits	<b>28/Wed</b> Vegetables  Fruits	<b>29/Thursday</b> Vegetables  Fruits	<b>30/Friday</b> Vegetables  Fruits	<b>1/Saturday</b> Vegetables  Fruits
<b>2/ Sunday</b> Vegetables  Fruits	<b>3/Monday</b> Vegetables  Fruits	<b>4/Tues</b> Vegetables  Fruits	<b>5/Wed</b> Vegetables  Fruits	<b>6/Thursday</b> Vegetables  Fruits	<b>7/Friday</b> Vegetables  Fruits	<b>8/Saturday</b> Vegetables  Fruits
<b>9/ Sunday</b> Vegetables  Fruits	<b>10/Monday</b> Vegetables  Fruits	<b>11/Tues</b> Vegetables  Fruits	<b>12/Wed</b> Vegetables  Fruits	<b>13/Thursday</b> Vegetables  Fruits	<b>14/Friday</b> Vegetables  Fruits	<b>15/Saturday</b> Vegetables  Fruits

## Appendix E

### Brochure



#### Add Vegetables to Every Meal

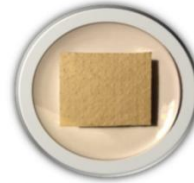
#### The Dietary Approaches to Stop High Blood Pressure Portion Control

- 10 inch plate
- 1/2 of a plate are vegetables and fruits
- No "seconds"



#### Increase

- Vegetables (4-5 servings/ day)
- Fruits (4-5 servings/ day)
- Taro
- Breadfruit
- Yam
- Banana
- Coconut
- Pandanus



#### Increase

- Whole-grains (6-8 servings/ day)
- Low-fat dairy products (2-3 servings/ day)
- Skinless poultry and fish (2 or less/ day)



- Nuts and legumes
- Non-tropical vegetable oils

#### Limit processed food

Sodium 2.3 g/day= 1 teaspoon salt

- Chips
- Spam
- Hotdogs
- Cold cuts and cured meats
- Canned meat
- Canned soup

#### Limit saturated and trans fats

- Fatty beef
- Pork
- Poultry with skin
- Butter
- Margarine
- Cream
- Cheese
- Fried food
- Pizza

#### Limit sugar-sweetened beverages and sweets

- 5 or less servings/ week

#### Notes

USDA. (n. d.). Choosemyplate.gov. Retrieved from [https://choosemyplate-prod.azureedge.net/sites/all/themes/cmp-responsive/images/cmp\\_slideshow\\_plate.png](https://choosemyplate-prod.azureedge.net/sites/all/themes/cmp-responsive/images/cmp_slideshow_plate.png)

#### STOP High Blood Pressure by Improving Dietary Habits



High blood pressure is one of the leading causes of developing cardiovascular diseases, strokes, kidney disease, and vascular dementia.

- **High Blood Pressure: >140/90**
- **At Risk for High Blood Pressure >120/80**

**Appendix F**

Vegetables from KTA



**Appendix G**

## Timeline

November 17, 2018	Recruitment of 30 individuals from the Health Fest
December 1-December 3, 2018	Meeting with participants in two weeks to record post intervention blood pressure, conduct a survey
December 15-December 17, 2018	Meeting with participants in another two weeks to record post intervention blood pressure, conduct a survey
December 22, 2018-January 22, 2019	Evaluation of results

**Appendix H**

## Budget

<b>Item</b>	<b>Estimated Cost</b>	<b>Final Cost</b>
30 bags with vegetables	\$300	\$300
Printing of brochures and food journals	\$30	\$75
Gift Cards	\$1500	\$700
<b>Total</b>	<b>\$1830</b>	<b>\$1075</b>