A Quality Improvement Project To Improve Dietary Habits In Patients With Hypertension In A Cardiology Clinic

By
Lori Barbosa
BSN, Washburn University, 2011

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Chair: Janet D. Pierce, PhD, APRN, FAAN, CCRN

_____
Member: JoAnn Peterson, DNP, APRN, FNP-BC

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The dissertation committee for Lori Barbosa certifies that this is the approved version of the following dissertation:

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Janet D. Pierce, PhD, APRN, FAAN, CCRN
Co-Chair

JoAnn Peterson, DNP, APRN, FNP-BC

Co-Chair

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Lori Barbosa
Specialty Area: Doctor of Nursing Practice- Family Practice

Committee Chair: Janet D. Pierce, PhD, APRN, CCRN, FAAN
Committee Member: JoAnn Peterson, DNP, APRN, FNP-BC

Problem: In the United States, 1 of 3 individuals is diagnosed with hypertension (HTN), which is approximately 70 million individuals (CDC, 2016). Uncontrolled HTN leads to complications such as arteriosclerosis, cerebral vascular accidents, kidney disease, and myocardial infarctions (Scisney-Matlock, Glazewki, McClerking, & Kachorek, 2006). In 2014, the Eighth Joint National Committee (JNC 8) brought together a panel of experts to create national guidelines to manage this disease. The first recommendation in this algorithm suggests adults 18 years and older implement lifestyle changes (James et al., 2014). These lifestyle changes consist of weight management, exercise, and diet. However, many patients do not adhere to such recommendations due to a variety of factors. One of these factors is inadequate teaching by the healthcare provider. Sessoms, Reid, Williams, & Henton (2015) found that only 4 of 62 patient records showed documentation of providing lifestyle modification education. Education on lifestyle modification can positively influence an individual's lifestyle and beliefs about their illness (Magadza et al., 2009). The hypertension guidelines often do not coincide with current practice of managing HTN because the provider does not mention lifestyle modifications during office visits.

Project Aim: The purpose of this quality improvement project was to determine if patients with HTN find a diet education pamphlet related to the DASH diet beneficial in helping manage their blood pressures.

Project Method: This quality improvement research project used the plan-do-study-act model as a conceptual framework. The Dietary Approaches to Stop Hypertension (DASH) diet is a dietary pattern promoted by the National Heart, Lung, and Blood Institute at the National Institutes of Health (NIH) to prevent and control HTN. This project began with implementing a pre-questionnaire to 100 individuals in the clinic to determine how many knew about the DASH diet. The next step was distributing educational pamphlets on DASH dietary recommendations and HTN to 30 hypertensive individuals in a cardiology clinic. After the patient reviewed this pamphlet the Project Director asked a series of questions (Appendix 3) to find if the pamphlet would be beneficial in managing their HTN. The teach-back framework by Street, Gordon, and Millay was used in which the patient described the information in the pamphlet to the educator. The teach-back method was utilized to determine if the patient understood the DASH diet and why this diet would assist them in lowering their blood pressure. The nutritional counseling was measured with a questionnaire including demographic data and a 5-point Likert Scale. The Fisher Exact Test was used to determine statistical significance. At the end, a post-questionnaire was implemented to assess if there was an increase in knowledge regarding the DASH diet.

Project Results: This quality improvement project demonstrated a slight increase in knowledge by HTN patients concerning the DASH diet and HTN. Prior to implementation, 35 out of 100

individuals knew about the DASH diet. Of those, only 20 followed the DASH diet nutritional guidelines. Following implementation of th project, 43 out of 100 individuals knew about the DASH diet. Of those, 27 followed the recommended DASH diet nutritional guidelines. The test measuring educational level and knowing about the DASH diet was statistically significant ($p= 0.004$) suggesting educational level was impacted if an individual knows about the DASH diet. Most HTN patients found the pamphlet useful and planned to use the DASH diet in the future.

Project Conclusion: The findings in this DNP project enhanced patient education regarding the DASH diet and HTN at Mid-America Cardiology. Individuals with HTN found the educational pamphlets beneficial and useful. Following a presentation of the results, the pamphlets were implemented in two Mid-America Cardiology locations, the Overland Park office and the main University of Kansas Health System office.

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Introduction

Hypertension (HTN) is abnormally high arterial blood pressure that is usually indicated by an adult systolic blood pressure of 140 mmHg or greater or a diastolic blood pressure of 90 mmHg or greater (American Heart Association, 2016). Hypertension is a major independent risk factor for cerebral vascular accidents, heart failure, coronary artery disease, and other diseases (American Heart Association, 2016). The diagnosis of HTN is based on the criteria set by the Eighth Joint National Committee (JNC). These criteria are based on the patient's age and comorbid conditions (JNC 8, 2014). The purpose of this Doctoral Nursing Practice (DNP) project was to improve dietary education processes related to HTN in a cardiology clinic. This was achieved by providing a one-page pamphlet of dietary advice (DASH diet) and a one-page pamphlet of HTN facts to patients with HTN. Current education processes related to HTN in this clinic were previously limited due to office visit time constraints and a lack of education material in the cardiology clinic. With these problems, the hypertensive patient is often unsure of proper dietary guidelines for reducing high blood pressures.

Background and Significance of Problem

According to the Center for Disease Control and Prevention (CDC), about 70 million individuals in the United States have HTN. Of those 70 million individuals, approximately 52% have their blood pressure within the normal guidelines limits (CDC, 2016). Hypertension is often a modifiable risk factor for many patients. Uncontrolled HTN may lead to serious medical conditions such as heart disease, heart failure, and cerebrovascular accidents (Scisney-Matlock, Glazewki, McClerking, & Kachork, 2006). These can be prevented through lifestyle modifications. Recently, individuals are turning more to self-management for their chronic diseases (Baynouna, Neglekerke, Ali, ZeinAlDeen, & Al Ameri, 2014). Lifestyle education

allows patients to manage HTN through their own choices because it identifies the potential cause of high blood pressures.

In management of HTN, one of the first steps is lifestyle interventions. The American Heart Association (2015) recommends a heart-healthy diet, or DASH (Dietary Approaches to Stop Hypertension), which emphasizes fruits and vegetables, whole grains, low-fat dairy, poultry and fish for protein, nuts and legumes, and non-tropical oils. Another recommendation is a low salt diet, less than 2 grams a day. If patients follow the recommendations, blood pressures are lowered significantly. On the DASH diet, the systolic blood pressure lowers an average about 7.7 mmHg and diastolic blood pressure lowers an average of 3.6 mmHg (Blumenthal et al., 2010). This reduction can prevent adverse effects related to uncontrolled blood pressure. Studies estimate an average reduction of 5 to 6 mmHg can reduce incidents of stroke, coronary heart disease events, cardiovascular events and death (Slimko & Mensah, 2010).

There are various reasons patients do not adhere to the recommended dietary guidelines. Lack of education is a common reason why patients do not adhere to the DASH diet. Bentley, De Jong, Moser, and Peden (2004) stated that healthy diets were not being adhered to because patients did not understand what constituted a proper diet and preparation. Sessoms, Reid, Williams, and Hinton (2015) found only 6.5% of the providers in their study provided a patient with DASH diet guidelines. Lifestyle interventions alone can result in a 17% reduction in HTN and 6% reduction in coronary artery disease (Scisney-Matlock, Glazewki, McClerking, & Kachork, 2006).

Improving diet education in a cardiology clinic will increase the use of diet recommendations by HTN patients that were suggested by JNC 8, the American Heart Association, and the American College of Cardiology. Education related to HTN and the DASH

diet will be provided to patients with HTN and implemented through a quality improvement project in a cardiology outpatient clinic.

Importance

Controlling HTN is a major goal of the American Heart Association. By the year 2020 the goal is to improve cardiovascular health by 20% and reduce mortality rate by 20% (Go et al., 2014). One way to accomplish this goal was through implementing a dietary education pamphlet in a cardiology clinic. This project evaluated whether patients found a DASH diet education session beneficial. Information collected in this project was used to determine if the cardiology clinic will use this pamphlet in the future. The method to provide patient education used in this project could be used with other cardiology conditions. This project is also important because it emphasizes the importance of the first recommendation set by JNC 8 related to lifestyle modifications (James et al., 2014).

Problem Statement

The lack of education provided to patients with HTN often results in non-adherence to dietary recommendations suggested by national guidelines (JNC 8). Health care providers should attempt to educate patients on the recommended dietary HTN guidelines. Research has shown that when a HTN diet is adhered to, blood pressures can significantly be reduced (Lin et al., 2014; Bluementhal et al., 2010; Sayer et al., 2015; Ndanuko et al., 2016). This decrease in blood pressure reduces the risk of cerebral vascular accidents and other cardiovascular disease.

Purpose

The purpose of this project was to improve dietary education processes related to HTN in a cardiology clinic. This project had following objectives: (1) develop a handout based on evidence-based research discussing diet and HTN, (2) educate patients on dietary

recommendations and inquire if they find the information beneficial and valuable, (3) present results to healthcare providers at the cardiology clinic, (4) change the culture of the clinic related to the DASH diet and HTN, and (5) implement evidence-based guidelines to create change. For the purpose of this project, the PICO (Population, Intervention, Comparator, and Outcomes) question was: "Will patients with HTN in a cardiology clinic find a HTN dietary pamphlet beneficial to reduce or maintain a normal blood pressure?"

Definitions of Terms

Conceptual definition of hypertension: Hypertension is a condition in which systolic blood pressure is higher than 120 mmHg and diastolic blood pressure is above 80 mmHg, averaged over time (Sessoms, Reid, Williams, & Hinton, 2015). The American Heart Association Guidelines are as follows:

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

Aged 60 or older, HTN is diagnosed at 150/90 mmHg and those younger than 50, those with diabetes mellitus, or with chronic kidney disease, HTN is diagnosed at 140/90 mmHg (James et al., 2014).

Operational definition of hypertension: Hypertension for this project was defined as a blood pressure greater than 140 mmHg systolic and 90 mmHg diastolic. Their blood pressures

were obtained at each office visit by the medical technician. Those medical technicians let the project director know what their blood pressure was at the time of the office visit.

Conceptual definition of DASH diet: The DASH diet is a set of recommendations endorsed by the American Heart Association. It is low in sodium, high in vegetables and fruits, whole grains, poultry or fish, nuts and legumes (American Heart Association, 2015). DASH is recommended for those individuals who have been diagnosed with HTN (Delichatsios & Welty, 2005). The goal of the DASH diet is to emphasize fresh, healthy foods and minimize foods high in sodium and fried foods. The DASH diet is high in potassium, calcium, magnesium, fiber, and protein (Lin et al., 2007). While it is high in essential nutrients, it is also low in total fat, saturated fat, and cholesterol (Lin et al., 2007). The DASH eating plan consists of the following: 6-8 servings per day of whole grains, 4-5 servings per day of vegetables, 4-5 servings per day of fruits, 2-3 servings per day of fat-free or low-fat milk, 6 servings or less per day of lean meats, poultry, and fish, 4-5 servings per week of nuts, seeds, and legumes, 2-3 servings per day of fats and oils, and less than 5 servings per week of sweets (U.S. Department of Health and Human Services).

Operational definition of DASH diet: For this project, the standard DASH diet listed above was used. The DASH diet was summarized into a one-page pamphlet. A short questionnaire was used to measure the participant's knowledge, attitude, and skill level of the DASH diet and HTN.

Conceptual definition of nutritional counseling: Nutritional counseling will be completed in the form of patient education. Nutrition counseling consists of patient-centered communication discussing dietary behaviors (Spencer et al., 2006). Patient education is face-to-face teaching or group sessions by the healthcare professionals (Harris, Smith, & Veale, 2005).

Educational materials are effective in providing patient education and create an opportunity for patients to understand their condition (Magadza, 2009). To assess the patient's understanding, the teach-back method will be used. The teach-back method is one in which the individual repeats to the provider in their own words what they were taught (Hyde & Kautz, 2013). The focus of nutritional counseling in this project will be the DASH diet.

Operational definition of nutritional counseling: Nutritional counseling was provided to the patient with an educational pamphlet describing the DASH diet and HTN (Appendix 9). The teach-back method was implemented to ensure the patient understood the material. Once an individual reviewed the pamphlet, they explained what they learned from the pamphlet.

Conceptual definition of a cardiology clinic: A cardiology clinic is an office that specializes in the heart. Cardiology is defined as "the study of the heart and its action and diseases" (Merriam-Webster, 2016). The clinic is an office space often partnered with a hospital organization.

Operational definition of a cardiology clinic: The cardiology clinic setting in this project was Mid-America Cardiology which is part of the University of Kansas Health System. This organization has six different locations. The location of this clinic was in Overland Park, KS. The clinic consists of cardiologists, nurse practitioners, registered nurses, and medical technicians. The clinic has a total of 38 cardiologists, 5 cardiology nurse practitioners, 36 registered nurses, and 20 medical technicians.

Literature Review

A database search was completed using PubMed, CINHAL, Cochrane Library, and ClinicalKey with the following words: "blood pressure," "hypertension," "diet," "nutrition," "education," "patient education," "DASH," "barriers," and "adherence." Inclusion criteria were

peer reviewed, primary journal articles, written in the English language, and adult participants ages 18 and older.

Barriers to patients not following the recommendations by the JNC 8 include patient non-adherence to dietary recommendations and healthcare providers not giving the necessary education. Lifestyle interventions are listed as the first step in managing HTN. This literature review focuses specifically on the DASH diet and HTN.

Hypertension

The average dietary sodium intake in the US is more than double the recommended amount (Levy, 2014). High sodium intake leads to vascular remodeling. Other pathological events that lead to HTN are psychosocial stress and obesity (Levy, 2014). All categories can be broken down to the cellular and molecular level.

Intracellular sodium plays an important role in the development of HTN. Increased dietary sodium intake leads to sodium and fluid retention (Levy, 2014). The fluid retention creates a pressure-natriuresis relationship (Katholi, & Rocha, Singh, 2009). The increased serum sodium "stimulates the sodium-calcium exchanger type 1 in the membrane, driving calcium into cells" (Adrogué & Madias, 2016, p. 1972). The increased serum sodium subsequently leads to potassium depletion (Levy, 2014). The sodium retention and potassium depletion from a defect in the renal ion transport mechanism results in an elevated systolic blood pressure and diastolic blood pressure (Levy, 2014). Potassium depletion leads to hypokalemia, which creates depolarization of the membrane in the vascular smooth muscle cells and shifts the membrane potential closer to zero (Adrogué & Madias, 2016). Resting cell membrane depolarization from hypokalemia promotes intracellular calcium to rise in vascular smooth muscle cells (Adrogué & Madias, 2016).

Nitric oxide (NO) is stimulated by the vascular endothelial growth factor (VEGF) type 2 receptor (VEGFR2) on endothelial cells (Lankhorst, Kappers, Van Esch, Danser, & Van Den Meiracker, 2014). NO is released and "regulates renal blood flow, tubular sodium reabsorption, tubuloglomerular feedback, renal hemodynamics, and pressure natriuresis" and is therefore an important component in blood pressure regulation (Lankhorst et al., 2014, p. 135). Hypertension from angiogenesis inhibition is related to NO depletion and endothelian-1 (ET-1) activation (Lankhorst et al., 2014). Both of these are related to VEGF inhibition. Depletion in NO creates a vasoconstriction effect, caused by sodium retention (Adrogué & Madias, 2016). Sodium retention alters NO synthesis through an increase in intracellular calcium (Walsh, Donnelly, & Lyons, 2009). Vascular endothelial growth factor inhibition is another pathway that affects NO. This pathway increases endothelial NOS (eNOS) and inducible NOS (iNOS) creating flushing and a decrease in systolic blood pressure (Lankhorst et al., 2014). The bioavailability of the NO depends on the amount of reactive oxygen species (ROS). ROS is responsible for transforming NO to perioxynitrate (ONOO) (Lankhorst et al., 2014). This transformation of NO to ONOO leads to eNOS uncoupling and increased ROS production (Lankhorst et al., 2014). Endothelian-1 is a potent vasoconstrictor and activated by hypothermia, mechanical stress, histamine, and thrombin (Lankhorst et al., 2014). It works as a vasoconstrictor through interaction with G-protein- coupled membrane-bound ET_A and ET_B receptors (Lankhorst et al., 2014). This ET-1 activation also increases oxidative stress.

Inflammatory markers play an important role in hypertension. These components consist of ROS, inflammatory enzymes, and cyclo-oxygenase-2 (COX-2). Mitochondria are responsible for the large amount of cellular ROS production (Dikalov & Dkalova, 2016). During the Adenosine diphosphate (ADP) to Adenosine triphosphate (ATP) conversion, a chain leak is

identified and creates superoxide (Dikalov & Dkalova, 2016). Superoxide is then converted to hydrogen peroxide by mitochondrial superoxide dismutase (SOD2) (Dikalov & Dkalova, 2016). Mitochondrial ROS and NADPH oxidase have a synergistic relationship, increasing the amount of ROS circulating (Dikalov & Dkalova, 2016). Oxidative stress occurs when there is an imbalance of ROS production and the cellular antioxidant system (Dikalov & Ungvari, 2013). ROS eventually leads to oxidative stress through enzymes consisting of superoxide and hydrogen peroxide (Lankhorst et al., 2014). Oxidative stress leads to HTN through oxidation of NO to peroxynitrate, which decreases vasodilator tone (Lankhorst et al., 2014). NADPH oxidase interacts with angiotensin II further stimulating ROS production (Dikalov & Dkalova, 2016).

ROS impacts several organs including the brain, vasculature, and the kidney. ROS role in the brain affects hypertension through increasing sympathetic outflow (Dikalov & Dkalova, 2016). Its role in the kidney includes promoting sodium resorption and volume retention (Dikalov & Dkalova, 2016). The role in the vasculature includes promoting vasoconstriction, remodeling, and increasing systemic vascular resistance (Dikalov & Dkalova, 2016). Sources of this vascular ROS production is from NADPH oxidase, xanthine oxidase, uncoupled nitric oxide synthase, and mitochondria (Dikalov & Ungvari, 2013). The mitochondria have been found to make an impact in mesenteric resistance arteries and the aorta (Dikalov & Ungvari, 2013).

Prostanoid is another modulator that impacts vascular tone. These molecules are produced from arachidonic acid by COX-1 and COX-2 (Hernanz, Briones, Salaices, & Alonso, 2014). Inflammatory markers such as hydrogen peroxide, angiotensin II, and endothelian-1 induce COX-2 to eventually produce prostanoids (Hernanz et al., 2014). COX-1 is induced through hydrogen peroxide and from excessive ROS production (Hernanz et al., 2014). Prostanoids exert their effects based on the receptor site. First, the prostanoid binds to

prostaglandin E_2 (PGE_2). The PGE_2 then binds to one of four G-protein-coupled receptors (GPCRs) (Sugimoto & Narumiya, 2007). Receptors EP_1 and EP_3 induce vasoconstriction while EP_2 and EP_4 induce vasodilation (Hernanz et al., 2014). All four EP receptors induce platelet aggregation, monocyte migration, macrophage migration, smooth muscle cell proliferation and migration, cytokine production, and MMP activation (Hernanz et al., 2014). All of these mentioned components lead to alterations in vascular function, structure of vasculature, and hypertension (Hernanz et al., 2014).

Overtime, high dietary sodium intake may lead to vascular remodeling. The remodeling is related to stimulation of the sympathetic nervous system (SNS) and the renin-angiotensin-aldosterone system (RAAS) (Levy, 2014). SNS stimulation is through efferent renal nerves and baroreceptors. Low SNS stimulation results in sodium reabsorption while higher stimulation stimulates the release of renin (Goldsmith, Sobotka, & Bart, 2010). High-caloric intake also stimulates the SNS system through releasing plasma norepinephrine (Kotsis, Stabouli, Papakatsika, Rizos, & Parati, 2010). The RAAS pathway starts in the juxtaglomerular cells of the kidney with the synthesis of renin (Mascolo et al., 2016). Renin then activates pro-renin and creates a pro-renin receptor (PRR) (Mascolo et al., 2016). The release of renin determines the production of angiotensin I (AI) (Mascolo et al., 2016). Angiotensin I is then converted to AII through the Angiotensin Converting Enzyme (ACE) (Mascolo et al., 2016). AII interacts with G protein-coupled receptors. One of these receptors (AT1) causes vasoconstriction and an increased release of catecholamines and aldosterone (Mascolo et al., 2016).

The sodium and fluid retention, RAAS activation, and SNS stimulation create vascular changes and remodeling. Small arterial vessels are predominantly responsible for blood pressure control (Martinez-Lemus, Hill, & Meininger, 2009). Structural characteristics and the level of

vasoconstriction determine the diameter of the small vessels (Martinez-Lemus et al., 2009). The remodeling changes related to HTN include cytoskeletal organization, cell-to-cell connections, and extracellular matrix composition (Martinez-Lemus et al., 2009). Stimuli that cause this remodeling include mechanical forces, neurohumoral factors, and paracrine agents (Martinez-Lemus et al., 2009). Some of those factors include the release of vasoactive substances such as nitric oxide, prostaglandins, and growth factors (Martinez-Lemus et al., 2009). Blocking the Rho kinase signaling pathway blocks the initial vasoconstrictor effect from mechanical and neurohumoral stimuli (Martinez-Lemus et al., 2009). When arterioles are exposed to neurohumoral stimuli over hours, the ability to return to their previous diameter diminishes once the vasoconstrictor agonists are removed (Martinez-Lemus et al., 2009). The remodeled arterioles affect the cytoskeleton. The changes stiffen the cytoskeleton and reduce elasticity (Martinez-Lemus et al., 2009). Vascular remodeling, SNS stimulation, and RAAS activation increase the production of collagen. This increase in collagen stiffens vascular walls and results in reduced cardiac output (Martinez-Lemus et al., 2009).

Stress and obesity also can lead to HTN. Stress is not a constant variable; it is perceived by an individual and based on a behavioral or physiological response (Logan & Barksdale, 2008). This stress response activates the hypothalamic-pituitary-adrenal (HPA) axis and SNS. Repeated stressors or long-term stress creates an allostatic load (Logan & Barksdale, 2008). The allostatic load is the "long-term result of failed adaptation, resulting in pathology" (Logan & Barksdale, 2008, p. 201). In this allostatic load, adrenaline, glucocorticoids, and cytokines are released continuously and cause tissue damage (Logan & Barksdale, 2008). This sustained stress triggers an adaptive response and is a modulator to blood pressure (Levy, 2014). Obesity correlates with HTN. High intake of fat and carbohydrates stimulate peripheral a1- and b-

adrenergic receptors (Kotsis et al., 2010). SNS stimulation is occurs because there is impaired function of the baroreceptor with increased levels of circulating free-fatty acids, angiotensin II, insulin, and leptin. The increased levels of free-fatty acids increases adrenergic tone (Kotsis et al., 2010). Both lysophospholipids and free-fatty acids increase vascular smooth muscle tone and resistance therefore inhibiting the Na^+/K^+-ATPase and the sodium pump (Kotsis et al., 2010). An increase in renin, cortisol, and aldosterone are all associated with obesity (Kotsis et al., 2010; Levy, 2014).

DASH Diet

The DASH diet is high in several key nutrients including potassium, calcium, magnesium, fiber, and protein while being low in fat and cholesterol (Lin et al., 2007). The diet puts an emphasis on vegetables and fruits while minimizing fried and fatty foods. This diet can significantly lower blood pressures and reduce the risk of complications. Individuals that follow the DASH diet usually observe lower blood pressures because of the reduced sodium content in food.

The first study that incorporated the DASH diet was by Blumenthal et al. (2010), which compared this diet to a control diet in a randomized, controlled trial. The DASH diet consists of "diet high in low-fat dairy products, fruits, and vegetables; lower in fats; rich in fiber" (Blumenthal et al., 2010, p. 126). The DASH diet was further randomized into two groups: DASH alone (DASH-A) and/or with weight management (DASH-WM). DASH-A participants only received guidelines for their diet and were asked not to exercise to avoid losing weight. The DASH-WM participants received a controlled menu plan with cognitive-behavioral weight loss intervention and supervised exercise sessions. The control consisted of the participants' usual diet; these participants were instructed to maintain normal diets for four months. This

intervention occurred over two weeks, included 144 participants who were all older than 35, and was located in a tertiary care medical center. Blood pressure measurements in the clinic were obtained using a manual cuff method and with an automated blood pressure instrument. Measurements were also obtained in the individuals' home environment with an automated blood pressure machine four times during the day and two times at night; the mean 24-hour ambulatory blood pressure measurement was used.

Nutrition assessment was completed with food frequency questionnaires. A retrospective questionnaire was used to recall typical consumption in a four-week period and a four-day food diary. This study found both DASH diets significantly lowered systolic ($p<0.001$) and diastolic blood pressures ($p<0.001$) compared to the control. In more detail, DASH-WM lowered systolic blood pressure ($p=0.01$) and diastolic blood pressures ($p=0.06$) compared to DASH alone. At the end of this treatment, 19 participants were classified as hypertensive in the control group, compared to six in the DASH-WM and seven in DASH-A.

Another study that observed the effects of the DASH diet was by Sayer, Wright, Chen, and Campbell (2015). This study was different because, instead of weight management interventions, it analyzed various sources of protein. The groups consisted of DASH-P (pork) and DASH-CF (chicken and fish). This was a randomized crossover study consisting of 19 participants, who were randomly assigned to one protein for six weeks, then switched to the other protein after a four-week washout period. This design was different than the studies previously mentioned because the participants were able to take part in both interventions. Blood pressures were measured manually and with a 24-hour ambulatory monitoring system. Blood and urine analysis was also collected at various points throughout this study. Protein type did not affect glucose, insulin, triglycerides, LDL, and BUN. Total cholesterol was lowered and

HDL was raised in the pork intervention. Systolic and diastolic blood pressures did not differ between the types of protein, but both lowered blood pressure.

Consistent with previous studies, Lin et al. (2007) completed an 18-month multicenter, randomized control trial to compare lifestyle intervention to an advice-only group. The two interventions were a behavioral lifestyle intervention group and a behavioral lifestyle intervention group plus DASH diet. The subjects in the control group received only advice. The intervention groups completed weekly group sessions for eight weeks, then biweekly sessions for 6 months, and then monthly meetings for 12 months. The intervention used in this study was based on the social cognitive theory. Group sessions were used for social support and gaining knowledge while observing others. Both intervention groups received the following lifestyle advice: weight loss of 15 pounds for those who have a BMI greater than 25, 180 minutes of moderate-intensity exercise per week, dietary sodium restriction of 2,300 mg/day, and an alcohol limit of 1 oz. per day for men and 0.5 oz. per day for women (Lin et al., 2014). The lifestyle plus DASH group received the following additional counseling: 9-12 servings of fruit and vegetables, 2-3 servings of low-fat dairy products, and a limit of total and saturated fat to 25% and 7% per day (Lin et al., 2014). The control group received a 30-minute advice session at the time of randomization. Dietary recalls and blood pressures were assessed at six months and 18 months. At six months, both intervention groups reduced systolic and diastolic blood pressures. The lifestyle advice intervention group had a reduction of 4 mmHg systolic and 1.2 mmHg diastolic (Lin et al. 2014). The lifestyle advice intervention plus DASH intervention group had a reduction of 4.5 mmHg systolic and 2.1 mmHg diastolic (Lin et al., 2014). At 18 months, these numbers reduced to 1.2 mmHg systolic and 0.8 mmHg diastolic for the lifestyle group and 2.1 mmHg and 1.0 mmHg diastolic for the lifestyle plus DASH group (Lin et al., 2014). This study found the

lifestyle advice plus DASH education minimally improved blood pressure compared to lifestyle advice alone or the control group.

Sacks et al. (2001) evaluated dietary sodium intake, dietary patterns, and the effect of these interventions on blood pressures. The study enrolled 412 participants that were older than 22 years old. A key inclusion criterion was a systolic blood pressure of 120 to 159 mmHg and a diastolic blood pressure of 80 to 99 mmHg. There were three groups: high sodium intake (3.3 g/day), intermediate sodium intake (2.5 g/day), and low sodium intake (1.5 g/day). In each group there was randomization of a control group and a DASH group. The control group consisted of their normal eating habits. The DASH diet described was similar to the diets in the study by Lin et al. (2014) and Blumenthal et al. (2010). This study did not state if the participants were provided education prior to starting the study. The participants were provided their daily food intake for the duration of the study to ensure consistency. Blood pressures were monitored weekly during the 30-day study and the last five clinic days of the study. The amount of dietary sodium had a greater effect on the control group compared to the DASH diet ($P<0.001$). The DASH diet compared to control diet lowered the systolic blood pressure in each of the three sodium clinical groups (high, intermediate, and low). There was a larger effect on systolic and diastolic blood pressures in the high sodium groups compared to the intermediate and low sodium groups ($p<0.001$). The effects were greater in those with HTN compared to those without HTN ($p=0.01$). In comparing the control group with high sodium (the average American diet) to the DASH diet with low sodium, there was a significant reduction ($p<0.001$) of 11.5 mmHg systolic blood pressure in those with HTN, 7.1 mmHg systolic blood pressure in those without HTN, and 6.8 mmHg in men and 10.5 mmHg in women (Sacks et al., 2001). These

findings are consistent with the previous studies in that the DASH diet is effective in lowering a patient's blood pressure.

In comparative terms, all four studies found benefits to the DASH diet. In two studies, lifestyle modifications were added to the DASH diet intervention and found a greater reduction in both systolic and diastolic blood pressures. Another study focused on the various types of proteins in the DASH diet; however, the diet was not found to make a difference on the blood pressure measurements. The final study evaluated dietary sodium intake with the DASH diet. All studies found the DASH diet was effective in lowering blood pressures in subject participants. This was consistent with a meta-analysis conducted by Ndanuko, Tapsell, Charlton, Neale, and Batterham (2016). In this analysis, they compared several studies to evaluate which dietary patterns are most effective in lowering blood pressures. They concluded, that patients that use the DASH diet have lower blood pressures and that incorporating a healthy lifestyle with dietary changes further reduces blood pressures (Ndanuko et al., 2016).

Barriers when providing nutrition advise

Several studies have found that there are potential barriers to providing patients with nutritional advice (Kolasa & Ricket, 2010). Studies have also demonstrated 6.5% of providers educate their patients on dietary recommendations (Sessoms et al., 2015). Dietary recommendations used by clinicians for patient education are from national guidelines set by professional organizations.

Eaton, Goodwin, and Strange (2002) performed a cross-sectional study and observed 84 physicians in a family physician practice who provided nutritional counseling to patients. Research nurses observed participating physicians for two consecutive days and used a checklist to identify frequency of nutrition counseling, time spent providing counseling, and patient

characteristics. In the end, they found 6% of the physicians provided their patient with nutrition counseling (Eaton et al., 2002). Over the course of two days there were over 3000 office visits. Of those 3000 office visits, 24% received nutrition counseling (Eaton et al., 2002). Office visits were characterized by acute illness, chronic illness, and well-care visits. Counseling occurred in 17% of the acute visits, 30% of the chronic illness visits, and 41% of the well-care visits (Eaton et al., 2002). The average time spent providing nutrition counseling was 55 seconds. There were a total of 595 patients seen for HTN and 30.8% of those received nutrition counseling. This study did not go in detail regarding perceived barriers in providing nutritional counseling.

There are limited research articles that relate to barriers specifically addressing nutritional counseling. Kolasa and Ricket (2010) reviewed a study completed by Kushner (1995). Both studies evaluated barriers to providing nutrition counseling. The sample in the study by Kushner (1995) was derived from a random-sample mailed questionnaire. There were a total of 1,103 physicians that responded to the questionnaire related to nutritional counseling. They practiced in various locations in Maryland including private practices, hospitals, and self-employed. There were three categories assessed: time spent providing counseling, percentage of patients receiving counseling, and barriers in providing counseling. Physicians reported providing nutrition counseling to 50% of their patients. However direct observations and chart audits often reveal much lower percentages.

Eaton et al. (2002) found physicians reported educating a higher volume of patients. However, the study found that less than half of their patients received the proper counseling. Physicians reported spending 5 minutes or less providing dietary education to their patients (Kushner, 1995). This is consistent with the study by Eaton et al. (2002) who found the average time providing counseling was less than one minute. Finally, several barriers were identified in

providing nutrition counseling, including lack of time, patient noncompliance, inadequate teaching material, lack of training, lack of knowledge, inadequate reimbursement, and low confidence (Kushner, 1995). Kolasa and Rickett (2010) found physicians thought it was their responsibility to provide nutrition counseling but identified that only 21% of physicians experience gratification in providing nutrition counseling.

Harkin et al. (2015) also used a self-report survey and received 236 responses from internal medicine and cardiology physicians. This survey was an online, anonymous survey. It evaluated nutrition knowledge and attitudes. There was a low response rate of 26.7%. In this survey only 38% recommended the DASH diet. Over half (55%) recommended the Mediterranean diet for prevention of cardiovascular disease. The physicians reported nutrition is as important as statins in lowering cardiovascular disease risk. Of the 236 that responded, 13.5% felt they were adequately trained to provide nutrition counseling. More than half spent less than 3 minutes providing nutrition counseling to their patients. The amount spent educating patients was approximately the same among studies. Knowledge of which foods lower cardiovascular disease risk was similar between internal medicine physicians and cardiologists (Harkin et al., 2015). All studies reviewed identified inadequate training as a barrier in providing counseling.

Only one article was identified as including both physicians and nurse practitioners. Sessoms et al. (2015) did a retrospective review of medical records in a multi-physician practice in a rural community. This review evaluated whether providers were following national guidelines set by JNC 7 for African American patients with HTN. These include: diet, medication, lifestyle modification, and referral to HTN specialists. There was a total of 62 providers: 40 were physicians and 22 were nurse practitioners. Physicians provided care in a majority of the office visits (75.9%) compared to the nurse practitioners. Most of the patients

(87.1%) were on combination therapy for their HTN. Providers documented giving patients DASH recommendations in 6.5% of the population. However, 82.3% of the patients received information of physical activity, weight loss, and sodium restriction. Hypertension follow-up care was documented in 96.6% of the patients. In this study, there was a poor patient adherence to recommended dietary guidelines. Most individual's still had high blood pressures, which did not meet the clinic's goal in a majority of the patients in this practice. Perhaps blood pressures would have been maintained within normal values if the patients had received dietary counseling concerning limiting sodium intake. This study did not include discussion related to why there was a lack of documentation of providing DASH recommendations.

Another study by Wynn et al. (2010) evaluated attitudes and barriers in providing nutrition counseling. These researchers mailed surveys to family practice offices in British Columbia. The survey evaluated demographics of physicians, attitudes and barriers to nutrition counseling, and training in the area. There were over 800 surveys mailed and a total of 451 responded. A 10-point Likert scale was used to assess comfort in discussing nutrition with patients. Physicians were more comfortable discussing general nutrition rather than disease specific nutrition topics ($p<0.0005$). Comfort scores did not vary based on geographic region. Four questions were used to assess physician attitudes towards nutrition counseling. A 5-point Likert scale was used to evaluate scores, with higher scores indicating a positive attitude. Positive attitudes were most consistent with physicians younger than 50 ($p=0.009$). Physicians reported more than half of their patients would benefit from counseling; only 19.1% of those patients actually received the counseling. Almost all patients (95.2%) were referred to dietitians to receive nutrition counseling. Rural physicians referred more patients compared to those in urban areas. Physician comfort and attitude was a strong predictor if the patient would receive

nutrition counseling ($p<0.0005$). Two consistent barriers facing physicians who responded to the survey were inadequate time and compensation. Other barriers identified were patient compliance, patient knowledge about nutrition topics, ability to identify patients who would benefit, physician counseling skills, and physician knowledge about nutrition. Over 80% of physicians felt they had inadequate training in medical school. One third of the physicians have used reading and self-directed training to learn more about nutrition. The documents that were read by physicians were most often from journal articles and patient resources. Overall, half the physicians believed nutrition counseling would change the patients behavior (Wynn et al., 2010).

Eaton, McBride, Gans, and Underbakke (2003) found providers become more comfortable with providing nutrition education using the 5 A's method. This method addresses the problem, assesses the patient's motivation, advises patients on nutrition changes, assists patients with dietary and activity goals, and arranges frequent follow up (Eaton et al., 2003). Another barrier is the lack of reimbursement. Additionally, physicians and nurse practitioners both said they understood the importance of nutritional counseling and believed patients benefit from counseling. Physicians younger than 50 years of age had a more positive attitude and those in a rural community who were more likely to refer to a nutritionist. These studies indicate medical schools should increase nutrition education in their program.

Patient education methods

There are several ways to provide patient education in an office visit setting. One of the most cost effective means is face-to-face counseling. This technique allows providers to answer questions without a delay in communication. A pamphlet is a cost effective way to summarize the discussion. Providing information pamphlets while discussing lifestyle changes significantly increases retention of information (Magadza, Radloff, & Srinivas, 2009).

Delichatsios, Hunt, Lobb, Emmons, and Gillman (2001) conducted a study on providing participants with resources to improve dietary habits. One of the resources provided was dietary patient education booklets focusing on fruits and vegetables, red meat, and dairy foods. This study mailed personalized recommendations with education booklets to the patient's home address. This was then followed up with two motivational counseling sessions by telephone at two weeks and two months. Those in the intervention group received a personalized letter with target food groups, booklets on fruits, vegetables, and red meats, and information regarding food selection and preparation. A one-hour training session was provided to physicians and nurse practitioners at the start of the program. Following the two months, the intervention group increased their servings of fruits and vegetables by an average of 1.1 servings per day compared to 0.3 servings per day for the control group. There was no change in the amount of red and processed meats between groups. The intervention group increased fiber by 1 gram per day, folate by 20 μg per day, and vitamin C by 11 mg per day, and decreased saturated fat by 0.6%. Following receipt of the information, 71% of the participants discussed the education booklets with their primary care provider (Delichatsios et al., 2001). This study addressed the previously discussed barriers of lack of time and expertise by offering training sessions to providers and having educational booklets mailed to their home.

Magadza et al. (2009) evaluated the patient's understanding of HTN using motivational interviewing and questionnaires. In their case control study, 45 participants were interviewed and completed a questionnaire that evaluated their knowledge about HTN and the benefit of medication. A questionnaire was administered before and after the education. The education was composed of four parts: the concept of HTN, antihypertensive medication, adherence to medication, and diet and lifestyle recommendations. After the presentations, interviewing was

conducted on a monthly basis and an information leaflet was provided. Three weeks later, a self-administered questionnaire determined if the information was retained. They found motivational interviewing and questionnaires increase participant's knowledge about HTN and the importance of medication ($P<0.0001$). The findings suggest patient education provides patients with the opportunity to have questions and misunderstandings addressed. Magadza (2009) concluded that educational sessions could assist in altering a patient's belief that might lead to a change in their behavior. This study and the prior study discussed both showed educational interventions positively impact patient behavior.

A study by Scisney-Matlock, Glazewki, McClerking and Kachorek (2006) also examined patient perceptions and compliance with the DASH diet. This study was different than the one completed by Magadza (2009); it applies randomization to the sample of 53 women. There were two experimental groups: the first was the DASH diet only and the second was DASH diet and exposure to a home-based program. The intervention included an introduction to the DASH diet and a wheel that contained DASH diet information. The researchers then analyzed the frequency the patients used the wheel. The control group did not receive information but did take the same survey as the experimental groups. To understand the significance, the researchers surveyed both groups. The first survey was the "health promotion lifestyle profile" which was used to determine the compliance with healthy behaviors based on a 4-point scale. The second survey was a cognitive representation survey, which was used to assess the knowledge of, attitude toward, and skill with the DASH diet. Patients rated each based on how well it described them. Both surveys were implemented at 30, 60, and 90 days. The first changes were observed in the cognitive representation survey. At 60 and 90 days, the mean of all three categories (knowledge, attitude, and skill) were improved for the experimental group. Younger women were more

successful in making initial changes in diet. However, older women demonstrated more compliance with the DASH diet compared to younger women following the intervention. At day 90, knowledge, attitude, and skill were significantly higher in the experimental group compared to the control group ($p<0.001$, $p<0.009$, $p<0.003$) (Scisney-Matlock et al., 2006). They concluded using a DASH diet handout corrected inaccurate perceptions of the diet and improved compliance.

The final study by Rocha-Goldberg et al. (2010) focused on a Latino population in North Carolina. The population consisted of 17 individuals in a pretest/posttest study. The intervention consisted of six weekly sessions that provided participants information regarding HTN and lifestyle modifications. Motivational interviewing was used in each session to identify participants' weak areas. At the end of the six sessions they received a food and fitness guide. Participants set personal goals and received food and activity diaries. At the end of the study, participants concluded they were "very likely" to continue the recommendations. They indicated the most helpful topics were exercise, portions and servings, DASH dietary pattern, avoiding negative thoughts, meal planning, and calorie facts. For five of the participants it was difficult to use a diary while half the sample found it easy. There was a reduction in systolic blood pressure of 10.4-10.6 mmHg. There was a moderate effect size in reduction in weight and exercise (Rocha-Goldbeg et al., 2010). This study was consistent with finding educational sessions are beneficial in reducing blood pressure and getting participants to follow the recommended DASH diet.

As evidenced by the four studies under discussion, patients change their dietary habits through education. One study also found six educational sessions led to a reduction in systolic

blood pressure (Rocha-Goldbeg et al., 2010). All four studies provided the patients with an educational pamphlet that described diet recommendations.

Conceptual Framework

The framework to guide this DNP project was created by Dr. Deming. There are four key components in healthcare that were identified: (1) service, (2) products, (3) quality, and (4) efficiency. Dr. Deming thought organizations should focus on constant improvement and collaborate as a team. To meet these components, Plan-Do-Study-Act (PDSA) cycle was created.

PDSA cycle

The PDSA cycle is utilized to test quality improvement ideas (Byrne, Gang, & Carr, 2015). It focuses on developing, testing, and implementing new ideas (Gilliam & Siriwardena, 2013). There are four components to this cycle: plan, do, study, and act (PDSA) (The Deming Institute, 2016). Gilliam and Siriwardena (2013) summarized these phases into the following: in the first phase, the project is developed and objectives are set. Next, the project is implemented and the data collection begins. Then, data are analyzed and then summarized. Finally, necessary modifications are made prior to starting the next cycle.

The plan-do-study-act (PDSA) model was used for this DNP project. The PDSA model is a cycle that leads to identification of weak areas in a practice setting. The identification of weak areas leads to improvements in implementation and adherence to national guidelines. Using the PDSA model, the Plan phase developed the educational pamphlet concerning nutritional guidelines for HTN patients. This included both information on the DASH diet and methods to reduce HTN. The Do phase was the implementation of the educational pamphlet in a cardiology clinic and assessment of HTN patients related to the benefit and value of the pamphlet. The Study phase evaluated the information collected in this project and assessment if HTN patients

thought the pamphlet on dietary guidelines and HTN was useful for their HTN management. Finally, the Act phase included implementation of this type of educational strategy for HTN patients throughout the many Mid-America Cardiology clinic settings. At the end of the cycle, the project results were reviewed and were found to be beneficial to both HTN patients and healthcare practitioners in the clinic.

Teach-back method

The teach-back method is a communication technique used to assess the understanding of a new topic. It was utilized to assess the effectiveness of the educational pamphlet implemented in this project. The teach-back method "assesses learner's understanding by asking them to state back in their own words what they heard or understood after education is provided" (Mahramus et al., 2014, p. 205). The National Quality Forum and The Joint Commission recommended this method to assess the understanding of new material (Kornburger et al., 2013). The main purpose of incorporating this method is to evaluate the retention of new information provided to the learner (Mahramus et al., 2014). To implement the teach-back method, the educator provides a new concept or skill, which the learner repeats back in their own words (Kornburger et al., 2013). This was implemented in the "do" phase of the PDSA cycle.

The Street (1991), Street and Gordon (2006), and Street and Millay (2001) teach-back method was used as a framework for this DNP project. Participants had the opportunity to obtain an educational pamphlet that is located in the cardiology office. The participants reviewed this pamphlet before, during, or after their office visit. Following their office visit, questions were asked to find if the participants find the pamphlet beneficial. To understand what the patient gained from the pamphlet the teach-back method was implemented.

Project Assumptions

There were six assumptions of this DNP project.

1) The quality improvement project will be useful to increasing HTN patient education. The patient with HTN will gain a better understanding of HTN and the DASH diet.
2) The patients with HTN that choose to review the educational pamphlet will find it useful and beneficial.
3) The teach-back method will identify whether the patient with HTN understands the information on the pamphlet.
4) The cardiology practice will find the pamphlet on DASH diet and HTN useful in providing HTN patient education and implement it practice wide.
5) Most of the patients in this study will be in the age range of 50 and older.
6) Individuals with HTN in this clinic do not follow the DASH diet recommendations.

Methods

Project design and rationale

Quality improvement (QI) consists of systematic and continuous actions that lead to measureable improvement in health care services and the health status of targeted patient groups. The focus of improvement in this QI project was to increase patient education related to HTN and diet modifications. This project focused on increasing patient knowledge of the DASH diet and HTN, and increasing the education provided to patients with HTN in a cardiology clinic.

This DNP project was sent to the institutional review board (IRB) at the University of Kansas Medical Center (KUMC) for determination as a quality improvement project. The letter of approval as a QI project is located in Appendix 10. Once the Project Director received the IRB approval, permission was obtained from Mid-America Cardiology at the University of Kansas

Health System. Permission was obtained in writing with signatures from the Chief Practice Operations Officer and the Office Manager. This letter is located in Appendix 8. In this QI project, no personal patient or identifying information was recorded such as name, age, patient phone number, etc.

Project Sample

The project sample were patients with HTN in a cardiology office in a large university hospital setting in the Midwestern United States. All patients with HTN were at least 40 years of age and consisted of both female and male participants. Only English speaking HTN patients that could read at the 8th grade level were asked to participate. The Project Director did not access electronic medical records in this project. Patient data were not recorded and patient phone numbers were not used. The Project Director performed the QI project during the week (Monday through Friday) from 8 am to 5 pm when the clinic was open. The day of the week varied based on the Project Director's availability. When the Project Director was at Mid-America Cardiology, the project lasted the entire clinic day to optimize the number of individuals in the setting that were available to participate. The nurse working in the clinic setting on the selected day identified individuals who had a diagnosis of HTN. The individuals were identified through an electronic medical record. The HTN diagnosis needed to be listed as an established diagnosis set by a provider, either a cardiologist or a nurse practitioner. The clinic nurse notified the Project Director when an individual with HTN was identified. The Project Director approached the participant in the patient room and asked if the identified individual would participate in this QI project. If the individual agreed to participate, the Project Director proceeded with the below steps. If the individual did not agree, they kept the educational pamphlet for review and data was not collected.

The sample used in this project was a convenience sample. This sample represented those with a known diagnosis of HTN. The diagnosis of HTN is set based on blood pressure. The individuals in this project must have had past-elevated blood pressures that met the JNC 8 guidelines for the diagnosis. Blood pressures were often greater than 140/90 on more than one office visits. The Project Director provided a letter to those individuals identified by the clinic nurse that described the project attached to the educational pamphlet (Appendix 1) prior to their scheduled appointment in a private room. This letter helped address questions regarding the QI project and described the project in detail. If an individual decided to participate then a questionnaire (Appendix 3) was conducted. This questionnaire required less than 10 minutes for each participant. After the participant's scheduled office visit the Project Director discussed the pamphlet with the patient in a private room. This required the HTN patient to stay after the provider had completed their examination and required approximately 15 additional minutes. Only those HTN patients who volunteered to complete a series of short questions were eligible to participate.

Data collection

Once the Project Director received the designation from KUMC's Human Subject Department that this was a QI project, the Project Director notified the committee members and the cardiology clinic. Next, the Project Director called and met with the clinic manager at the cardiology office to review all the following planned steps in this QI project.

To begin this QI project, the Project Director created an educational pamphlet on HTN and the DASH diet. To create this pamphlet, a cardiology nurse practitioner and cardiology nutritionists were content experts that worked with the Project Director to produce a concise and informative pamphlet. On one side of the pamphlet, there was educational information for the

patient on HTN and important facts regarding the disease. The opposite side of the pamphlet contained educational information for the patient on the DASH diet and key components. The educational pamphlet is located in Appendix 9. A questionnaire (Appendix 3) was created to determine the patient's attitude, skills, and knowledge of the DASH diet and HTN.

Two experts on the DASH diet and HTN reviewed the educational pamphlet and questionnaire prior to implementation. The first expert was a nutritionist in the cardiology office setting. She has worked in this setting for 5 years and meets with some of the patients to teach them about the heart healthy diet. The second expert was a cardiology nurse practitioner. She has worked in the cardiology setting for over 10 years as a nurse practitioner and is very familiar with the JNC 8 guidelines and the DASH diet.

Data collection started with a pre-education questionnaire. The medical technician obtained the blood pressure from an individual in the clinic. That medical technician completed the form in Appendix 7. The medical technician obtained the blood pressures and recorded them on a specific form. They asked the individual if they knew about the DASH diet. If the individual did not know about the DASH diet, then no more questions were asked. If the individual did know about the DASH diet, they were asked if they follow the recommended guidelines. If the answer was no, they were asked why. This continued until 100 individuals were questioned prior to implementation of the educational part of the project..

The next step was implementing the educational pamphlet. Individuals were given approximately 15 minutes to review the pamphlet. Once a patient reviewed the educational pamphlet, this Project Director knocked on the patient examination room and asked the patient if they had sufficient time to read the HTN/DASH diet pamphlet. Over the next 10 minutes, in a private room, the Project Director asked the patient specific questions (Appendix 3) to determine

the individual's knowledge, skills, and attitude toward the DASH diet and HTN. To address this, a 5-point Likert scale was used. The individual chose which number related most to them. There was a key in the instructions prior to the questions. The numbers represented: 1 for strongly disagree, 2 for disagree, 3 for neither disagree or agree, 4 for agree, and 5 for strongly agree. This process was repeated until the sample of 30 individuals was met. The pamphlet was also distributed throughout the clinic for additional education opportunities.

After the educational pamphlet was distributed and 30 individuals completed a series of questions, the post-education questions were completed by the HTN patients. These questions were the same as the pre-education questions. These questions are located in Appendix 7. This process was repeated until a total of 100 individuals had completed the post-education questionnaire. A timeline discussing this is project is located in Appendix 4.

Data analysis

Once data were collected, they were analyzed to determine if the educational pamphlet was beneficial to the patients with HTN in the cardiology clinic. Descriptive statistics were used to determine the results of the questionnaire. The data were entered into an Excel spreadsheet and the Project Director worked with the Biostatistics Department at the University of Kansas to complete the data analysis. The statistician suggested using proportion calculations for the pre- and post-education questions and the Fisher Exact test with the information gained from the educational questionnaire. This demonstrated whether a relationship existed between questions and variables such as gender, age, or educational level. The Project Director used the descriptive statistics to demonstrate if the educational pamphlet was educational and beneficial.

Results

The Project Director began with a pre-education questionnaire (Appendix 7). A total of 100 individuals were questioned about the DASH diet and their blood pressures were obtained. Out of the 100 individuals questioned, 65, or 65% did not know about the DASH diet. Thirty-five individuals, or 35% did know about the DASH diet. Of those 35 individuals, 20 followed the DASH dietary guidelines. Fifteen individuals did not follow the DASH diet guidelines. Of those 15 individuals, only 10 provided a reason to the medical technician. Out of the 100 individuals questioned about the DASH diet, only 20% knew about the DASH diet and reported following those guidelines.

After the pre-education questionnaire, the educational pamphlet was implemented. A questionnaire was administered using a 5-point Likert scale to assess the individual's knowledge, skills, and attitude towards the DASH diet and HTN. Of the 30 individuals, 13 were males (43%) and 17 were females (56%). There were 26 individuals of Caucasian or European descent (87%), 3 African American individuals (10%), and 1 Asian American individuals (3%). Over half of the individuals (67%) were 69 or younger. Level of education was about evenly distributed. Forty-three percent had an Associate degree, high school diploma, or GED, and 56% had a Baccalaureate, Masters, or Doctoral degree. The demographic data related to the Likert Scale for each question is located in Appendix 11. In all questions, a majority of the population agreed or strongly agreed with the statements (Appendix 11). The first statement, "I know about the DASH diet" had 63% of the individuals agree or strongly agree. Females tended to agree more with this statement (70.5%) than males (54%) (Appendix 11). The second statement, "I am able to identify foods in the DASH diet," had 87% of the individuals agree or strongly agree. Eighty-eight percent of females agreed or strongly agreed and 84% of the males agreed or strongly agreed

(Appendix 11). The next statement, "I am knowledgeable about the relationship between the DASH diet and high blood pressure," had 77% of the individuals agree or strongly agree. This statement scored almost evenly between females (76%) and males (77%) (Appendix 11). The fourth statement, "I am capable of following the DASH diet on a daily basis," had 67% agree or strongly agree. Males and females rated this statement the same at 77% (Appendix 11). The fifth statement, "It is important to understand the DASH diet," rated the highest with 93% agreeing or strongly agreeing. This statement was about even between females (94%) and males (92%) (Appendix 11). The final statement, "It is important to follow the DASH diet," had 87% of the individuals agree or strongly agree. Males rated this statement slightly higher (92%) than females (82%) (Appendix 11).

The Fisher Exact Test using R software was used to analyze the data and to determine if the data were significant. A level of significance was set at $p<0.05$. Most of the data were not significant ($p>0.05$) therefore rejecting the null hypothesis that the data could be related to the selected demographics. One test was statistically significant ($p= 0.004$) which was the HTN patients educational level which suggests education impacts if an individual knows about the DASH diet.

Following the education phase, a post-education questionnaire was implemented (Appendix 7). This questionnaire was the same one used at the pre-education phase. The post-education questionnaire found 43 out of 100 knew about the DASH diet; the remaining 57 did not know about the DASH diet. Of those 43 individuals, 27 (62.7%) followed the DASH diet. There was an 8% increase in individuals knowing about the DASH diet in this clinic following the HTN and DASH diet counseling.

Discussion

The information collected prior to the educational brochure implementation was consistent with the literature review regarding nutritional education provided in an office. Sessoms et al. (2015) found only 6.5% of providers educate their patients on current dietary guidelines. The data collected in this project found 65% of HTN individuals do not know about the DASH diet in a cardiology office setting. Of the 35% HTN individuals that did know about the DASH diet, 57% actually followed the DASH diet. There were 15 individuals that knew about the DASH diet but did not follow the recommendations. Reasons ranged from lack of time or education, spouse knew about the diet but individual did not follow, working in the medical field, age, patient's perception that their blood pressures were within normal range, or the HTN patient did not want to follow the DASH diet or HTN guidelines.

The data from the educational sessions were broken down into four demographic categories: gender, age, ethnicity, and educational level. Educational level and knowing about the DASH diet was the only statistical significant finding. Most individuals "strongly agreed" with the statements on the questionnaire. There were occasionally individuals that "strongly disagreed" or "disagreed." The individuals that did mark those responses provided reasons. One reason was the DASH diet did not pertain to one patient because she lives in an assisted living facility and knows the food they serve does not follow the DASH diet. Two individuals admitted to not looking over the educational pamphlet prior to completing the questionnaire. The Project Director found the teach-back method useful in this project. By using this method, there was time for questions to be addressed and clarification of various areas related to the DASH diet. Most questions were regarding the amount of vegetables and various ways to cook those. Many

individuals found the educational pamphlet helpful and were excited to be able to take it home to use in the future.

A post-education questionnaire was conducted after the sample number of 30 individuals were obtained. That post-questionnaire was the same one used prior to the nutritional counseling. The post-education questionnaire demonstrated there was an increase in the HTN patient's knowledge at the clinic regarding the DASH diet. After the DNP project was completed, these results were presented to the office manager, clinic staff, and healthcare providers. The educational pamphlet in this project will be used in the future at Mid-America Cardiology. The DNP project should assist with changing the culture related to the educational pamphlet in the clinic concerning the DASH diet and HTN. The Project Director provided a copy to the other Mid-America clinic sites with the hope that they will also use the pamphlet for education of HTN patients.

There were six assumptions set prior to implementation of the project. Four of the assumptions were met. These include: patients gained a better understanding of HTN and the DASH diet, patients found the educational pamphlet useful and beneficial, the teach-back method identified those individuals who did not understand the DASH diet to ensure understanding, and a majority of individuals with HTN do not follow the DASH dietary recommendations. One assumption was shown to be incorrect: most patients in this project were between the ages of 40-79 and not 50 and older. The assumption regarding implementing the educational pamphlet into practice is still in progress.

There were limitations in this project. First, one cardiologist in the practice limited the implementation of the educational pamphlets to his patient due to their age. This could be one reason there are not individuals in this project older than 89.The other limitation was that

following the use of the Fisher Exact Test there were not significant differences ethnicity due to the lack of distribution of data. Level of significance is unknown for that demographic data. Finally, the last limitation was not knowing if the same individuals were in the pre- and post-education samples due to patient confidentiality.

Conclusion

The results of this project appear to indicate that there is a benefit to providing nutritional counseling in an outpatient office to HTN patients. Prior to implementing this project, only 35% knew about the DASH diet. Following implementation, 43% of the individuals knew about the DASH diet. The nutritional counseling increased DASH diet and HTN awareness in the clinic by 8%. The nutritional counseling was completed in the form of an educational pamphlet, one-on-one teaching, and the teach-back method to optimize retention of the new topic. Individuals in this project thought this nutritional counseling was beneficial to better understand how to follow DASH diet guidelines on a daily basis.

Summary

Many healthcare providers are not currently educating patients on the recommended dietary guidelines for HTN (Sessoms et al., 2015) because of time restrictions for patient visits. When individuals diagnosed with HTN adhere to the DASH diet, their blood pressures are significantly reduced (Lin et al., 2014; Bluementhal et al., 2010; Sayer et al., 2015; Ndanuko et al., 2016). To address this problem, a QI project was conducted where an educational pamphlet concerning HTN and the DASH diet at a cardiology clinic was given to HTN patients before their scheduled office visit. After the visit, a 10-minute interview with the patients with HTN was conducted to determine the usefulness of the pamphlet. The project results were shared with the clinic manager, providers, and staff. The presentation consisted of a summary of the results

and significant findings. Most of the staff were surprised to learn about the increase in DASH diet knowledge. The clinic manager made the decision to have the educational pamphlet permanently in the clinic. This is an example of how a quality improvement project can change a clinic culture and ultimately improve the outcomes of patients.

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Appendix 1

MID-AMERICA CARDIOLOGY
THE UNIVERSITY OF KANSAS HOSPITAL

10787 Nall
Suite 300
Overland Park, KS 66211
Phone: 913-588-9600
Fax: 913-588-9451

To whom it may concern:

We are performing a quality improvement study at this office. Attached to this letter is an educational pamphlet that discusses high blood pressure and dietary tips. If you choose to participate in this quality improvement project, the Project Director will discuss the pamphlet with you either before or following your appointment. Questions include if you thought this pamphlet was helpful, if you learned anything from this pamphlet, and if you would like to receive similar hand outs in the future. No personal information concerning you such as your name, age, address etc. will be used in this project. This will take about 10 minutes and will be done in a private room here in the Mid-America Cardiology Clinic.

If you wish to participate in this project, please let me know (Ms. Lori Barbosa)

Thank you for your time and consideration,

Lori Barbosa

Doctor of Nursing Practice Student

Appendix 2

KUMC HUMAN SUBJECTS COMMITTEE

REQUEST FOR QUALITY IMPROVEMENT/ QUALITY ASSURANCE DETERMINATION

Project Leader: Dr. Janet Pierce	
Department: School of Nursing	
Email: jpierce@kumc.edu	Phone: 913-588-1663
Alternate Contact Person (e.g., Project coordinator): Lori Barbosa	
Email: lmarshall2@kumc.edu	Phone: 785-806-1375

Project Title:

A QUALITY IMPROVEMENT PROJECT TO IMPROVE DIETARY HABITS IN PATIENTS WITH HYPERTENSION IN A CARDIOLOGY CLINIC

Project Number, Version and/or Date:
January 2017

1. **Briefly state the purpose of the proposed project.**
   The purpose of this project is to increase awareness of dietary recommendations by offering an educational pamphlet in a cardiology office. The handout will be based on evidence-based research discussing diet and hypertension.

2. **Describe the research that has already demonstrated the effectiveness of your intervention.**
   A randomized control trial by Lin et al. (2007) found the DASH diet leads to a reduction of 4 mmHg systolic and 2 mmHg diastolic blood pressure. Blumenthal et al. (2010) found a more significant reduction of 7.7 mmHg systolic and 3.6 mmHg diastolic just by patients following the DASH diet. Several studies have evaluated reasons for the lack of dietary education in office visits. One of the biggest reasons that was consistent in many studies was the lack of time and reimbursement (Kolasa and Rickett, 2010). Another reason was due to the lack of training received in school (Harkin et al., 2015). Using a pamphlet to provide education to patients increases retention of information (Magadza, Radloff, &Srinivas, 2009). They also found education programs are beneficial in helping patients understand hypertension

(Magadza, Radloff, & Srinivas, 2009). Scisney-Matlock, Glazewki, McClerking, & Kachoreck (2006) found a visual representation of the DASH diet increased adherence to the DASH diet.

3. **What types of data are needed for the project?**

   The project will be qualitative data. The data consists of finding if the patients find the brochure beneficial, if they would change anything, and if they learned anything from the session.

4. **Do you need access to identifiable patient records to complete the project?**

   No

5. **Which descriptions best fits your project?**

   Evaluate or improve the local implementation of widely-accepted clinical or educational standards that have been proven effective at other locations.

   Conduct a needs assessment to guide future changes in local health care delivery or to support other improvements at KUMC

   Develop interventions or educational strategies that improve the utilization of recognized best practices.

   Improve tools for patients that promote education, health literacy or treatment plan compliance.

6. **Does your project involve any of the following aspects?**

   Surveying a patient population
   Implementing a novel approach to care that may improve patient outcomes

7. **Which institutions are involved in the project?**

   KUMC only

8. **Which individuals or groups will receive the results of your project?**

   Presentation/publication

9. **How will your results be used to implement local improvements?**

   If the brochure is beneficial and helpful to the organization it will be implemented on a long-term basis and in all cardiology clinics at KUMC

Appendix 3

1. What is your gender?
    a. Male
    b. Female

2. What is your race or origin?
    a. American Indian or Alaska Native
    b. Asian American
    c. Black/African American
    d. Native Hawaiian or other Pacific Islander
    e. White/European American
    f. Other (please specify)

3. What is your age?
    a. 40-49
    b. 50-59
    c. 60-69
    d. 70-79
    e. 80-89
    f. 90 or older

4. What is your highest level of education
    a. High School or GED
    b. Associate degree
    c. Baccalaureate degree
    d. Master's degree
    e. Doctoral degree

For questions 5 through 10, please rate your opinion about the Dietary Approaches to Stop Hypertension (DASH) diet and high blood pressure (hypertension). Please rate your response based on the following: 1- Strongly Disagree; 2- Disagree; 3- Neither Agree or Disagree; 4- Agree; 5- Strongly Agree

5. I know about the DASH diet.

    1 2 3 4 5

6. I am able to identify foods in the DASH diet.

    1 2 3 4 5

7. I am knowledgeable about the relationship between the DASH diet and high blood pressure.

1 2 3 4 5

8. I am capable of following the DASH diet on a daily basis.

   1 2 3 4 5

9. It is important to understand the DASH diet.

   1 2 3 4 5

10. It is important to follow the DASH diet.

    1 2 3 4 5

Appendix 4

Project timeline

January 2017- submit proposal to committee

February 2017- present proposal defense

March 2017- begin project

April 2017- data collection

May 2017- submit findings

June 2017- DNP oral boards

July 2017- DNP public presentation

Appendix 5

Project budget

Copy and printing paper- one case $47.99

Black printer ink- $17.99

Tricolor printer ink- $23.99

Appendix 6

Abbreviations

Adenosine diphosphate (ADP)
Adenosine triphosphate (ATP)
Angiotensin I (AI)
Angiotensin II (AII)
Angiotensin Converting Enzyme (ACE)
American College of Cardiology (ACC)
American Heart Association (AHA)
Calcium (Ca)
Centers for Disease Control and Prevention (CDC)
Cyclo-oxygneanse (COX-1 or COX-2)
Diastolic blood pressure (DBP)
Dietary Approaches to Stop Hypertension (DASH)
Dietary Approaches to Stop Hypertension alone (DASH-A)
Dietary Approaches to Stop Hypertension with pork (DASH-P)
Dietary Approaches to Stop Hypertension with chicken and fish (DASH-CF)
Dietary Approaches to Stop Hypertension with weight management (DASH-WM)
Doctor of Nursing Practice (DNP)
Eighth Joint National Committee (JNC 8)
Endothelian-1 (ET-1)
Endothelial NOS (eNOS)
Hypertension (HTN)
Inducible NOS (iNOS)
Institutional review board (IRB)
Millimeters of mercury (mmHg)
Nitric Oxide (NO)
Ounce (oz.)
Perioxynitrate (ONOO)
Population, Intervention, Comparator, Outcomes, and Time (PICOT)
Plan-do-study-act (PDSA)
Potassium (K)
Prostaglandin E_2 (PGE_2)
Reactive oxygen species (ROS)
Registered Nurse (RN)
Renin-angiotensin-aldosterone system (RAAS)
Seventh Joint National Committee (JNC 7)
Sodium (Na)
Sympathetic nervous system (SNS)
Systolic blood pressure (SBP)
Quality improvement (QI)
University of Kansas Medical Center (KUMC)
Vascular endothelial growth factor (VEGF)

Vascular endothelial growth factor type 2 (VEGFR2)

Appendix 7

Blood Pressure: _____

Do you know about the Dietary Approaches to Stop Hypertension (DASH) diet: **Yes** **No**

If yes, do you use it: **Yes** **No**

If no, why?

_____

_____

_____

Appendix 8

MID-AMERICA CARDIOLOGY
THE UNIVERSITY OF KANSAS HOSPITAL

3901 Rainbow Boulevard
Ste G600
Kansas City KS 66160
Phone: 913-588-9600
Fax: 913-588-9770

To whom it may concern:

Lori Barbosa has permission to implement her quality improvement DNP final project at MidAmerica Cardiology.

Thank you,

Lori Barbosa
Doctor of Nursing Practice Student

Alice Mott
Overland Park Clinic Manager

[redacted]

Lynn Dreier
Chief Practice Operations Officer

[redacted]

Administration – **3901 Rainbow Blvd., Suite G600, Kansas City KS 66160** *(913) 588-9600*
Atchison – 820 Raven Hill Drive, Suite 106A, Atchison, KS 66002 (913) 367-3100
Legends – 2040 Hutton Rd, Lansing, KS 66109 (913) 279-5450
Overland Park-10787 Nall, Suite 300, Overland Park, KS 66211 (913) 588-9400
State Ave – 5701 State Ave, Suite 300, Kansas City, KS 66102 (913) 279-5450
Liberty – 1530 N Church Rd, Liberty, MO 64068 (816) 781-1696
St. Joseph – 3943 Sherman, St. Joseph, MO 64506 (816) 279-6666
Tremont – 5501 NW 62nd Terrace, Suite 201, Kansas City, MO 64151 (816) 584-8884

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Appendix 9

Page 1 (front page)

Hypertension

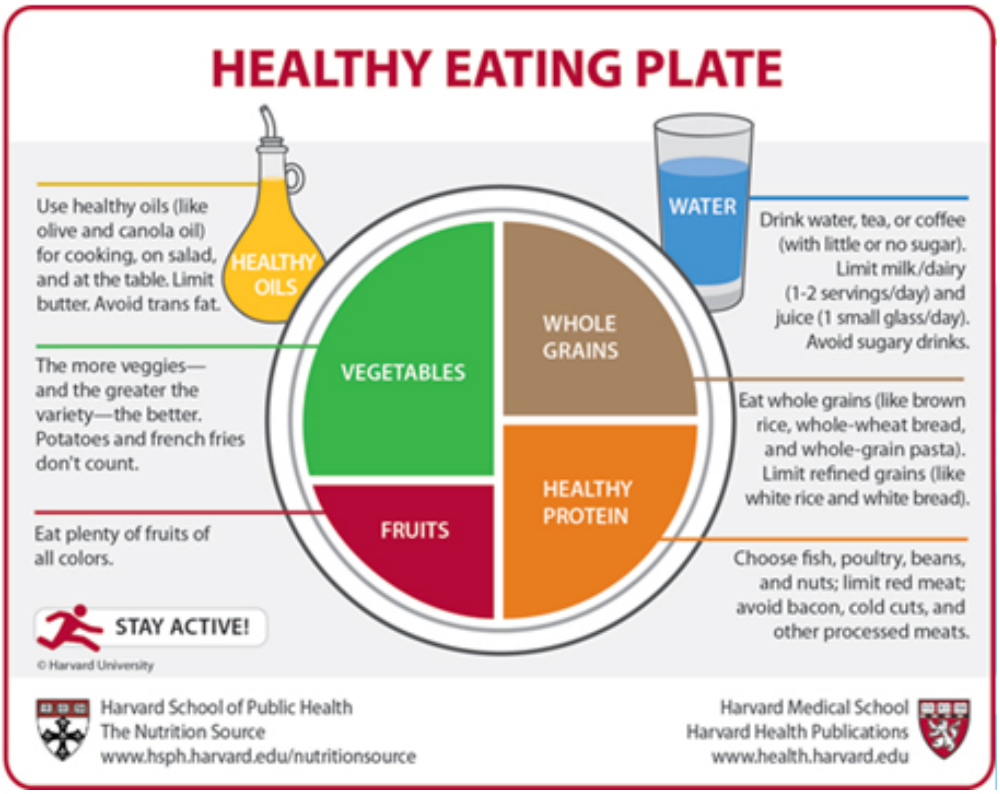
Age	Blood Pressure Goal
Older than 60	Less than- 150/90
Younger than 60 Diabetes Kidney Disease	Less than- 140/90

- Hypertension is high blood pressure
- The top number is the systolic blood pressure and the bottom number is diastolic blood pressure
- High blood pressure for long periods of time can lead to heart disease and strokes

- Monitor your blood pressure daily and keep a log

Page 2 (back page)

DASH Diet



- This diet is heart healthy and limits fats, cholesterol, and salt
- Half of your plate should be vegetables and fruits
- Eat less than 2,000 mg (2 grams) of sodium (salt) per day
- 1 teaspoon of salt equals 2 grams of salt
- Read food labels to check salt content
- Do not add salt to foods and do not cook with salt
- Eat fresh or frozen vegetables
- Avoid processed foods as much as possible

Appendix 10

The University of Kansas Medical Center

Human Research Protection Program

February 23, 2017

Project Title: A Quality Improvement Project to Improve Dietary Habits in Patients with Hypertension in a Cardiology Clinic

Institutional Contacts: Janet Pierce, RN, PhD, CCRN, FAAN; Lori Barbosa

Sponsoring Department: School of Nursing

Quality Improvement Determination

Thank you for your submission. The KUMC Human Research Protection Program (HRPP) has conducted a review of the above referenced project.

The current proposed project plan falls under one or more of the following quality improvement activities:

- Determine if a previously-implemented clinical practice improved the quality of patient care
- Evaluate or improve the local implementation of widely-accepted clinical or educational standards that have been proven effective at other locations
- Gather data on hospital or provider performance for clinical, practical or administrative uses
- Conduct a needs assessment to guide future changes in local health care delivery or to support other improvements at KUMC
- Perform an analysis to characterize our patient population/clients to improve quality of services
- Implement programs to enhance professional development for providers and trainees
- Measure local efficiency, cost or satisfaction related to standard clinical practices
- Develop interventions or educational strategies that improve the utilization of recognized best practices
- Implement strategies to improve communication within our local healthcare environment
- Improve tools for patients that promote education, health literacy or treatment plan compliance

Any presentation or publication resulting from this project should explicitly state that it was undertaken as quality improvement.

At this time, IRB review is not required. If a quality improvement protocol is revised to undertake a systematic investigation designed to answer a research question or produce knowledge that would be generalizable beyond the local setting, the HRPP will re-evaluate your project's regulatory status. More information about distinguishing quality improvement from research is available on the OHRP website at: http://www.hhs.gov/ohrp/policy/faq/quality-improvement-activities/index.html

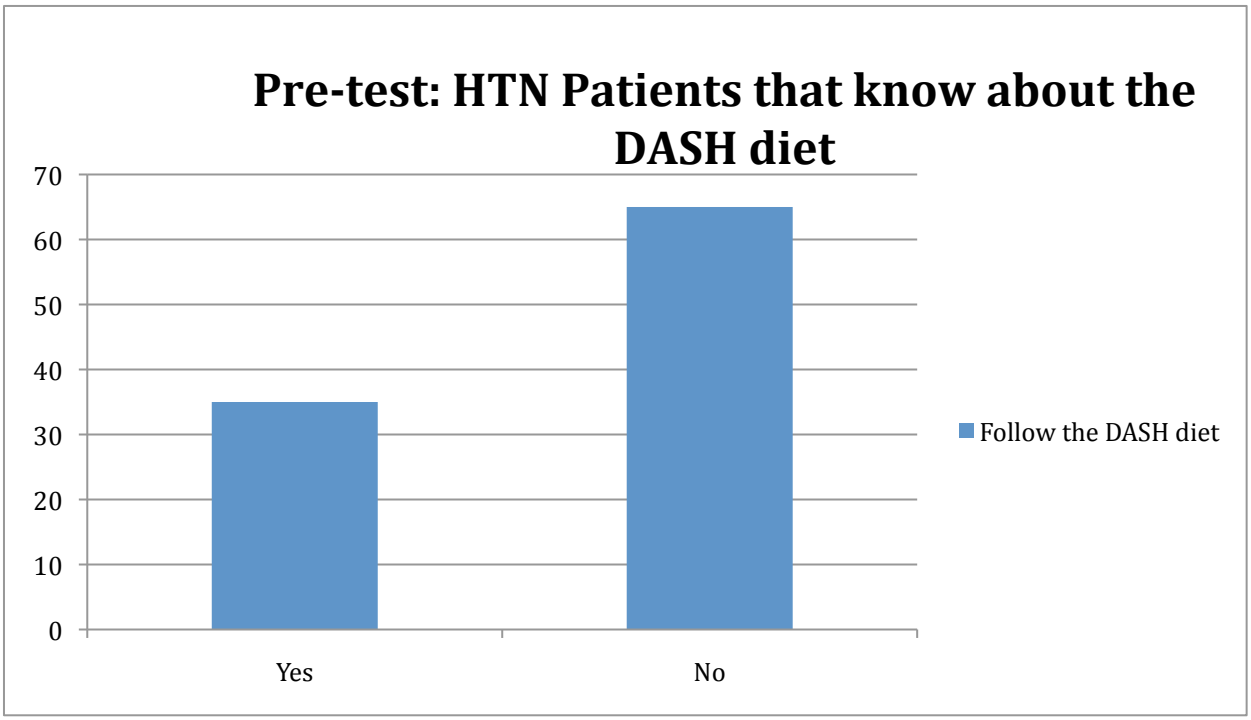
Very truly yours,

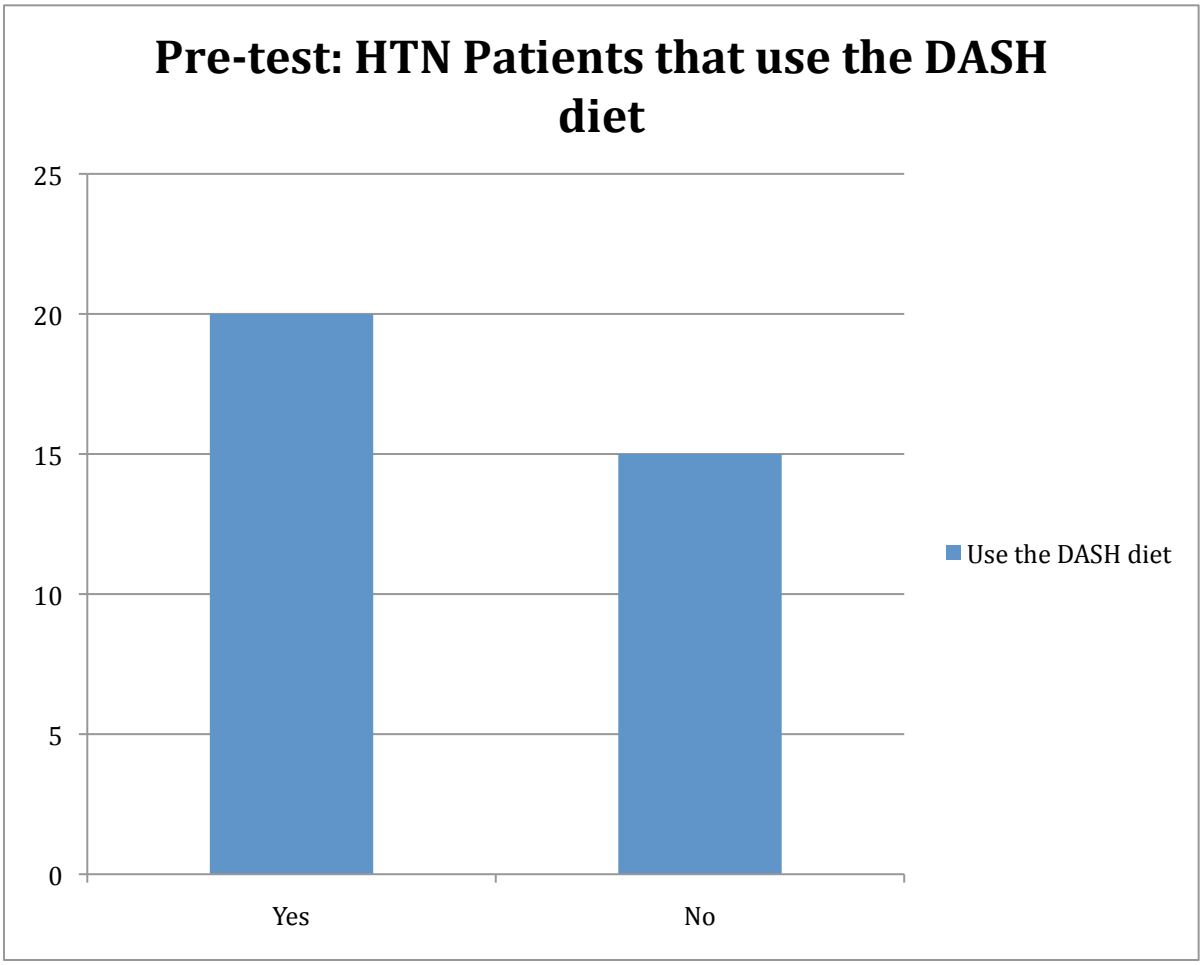
Karen Blackwell

Karen Blackwell, MS, CIP
Director, Human Research Protection Program
Mail-Stop 1032, 3901 Rainbow Blvd., Kansas City, KS 66160
Phone: (913) 588-0942 Fax: (913) 588-5771
kblackwe@kumc.edu

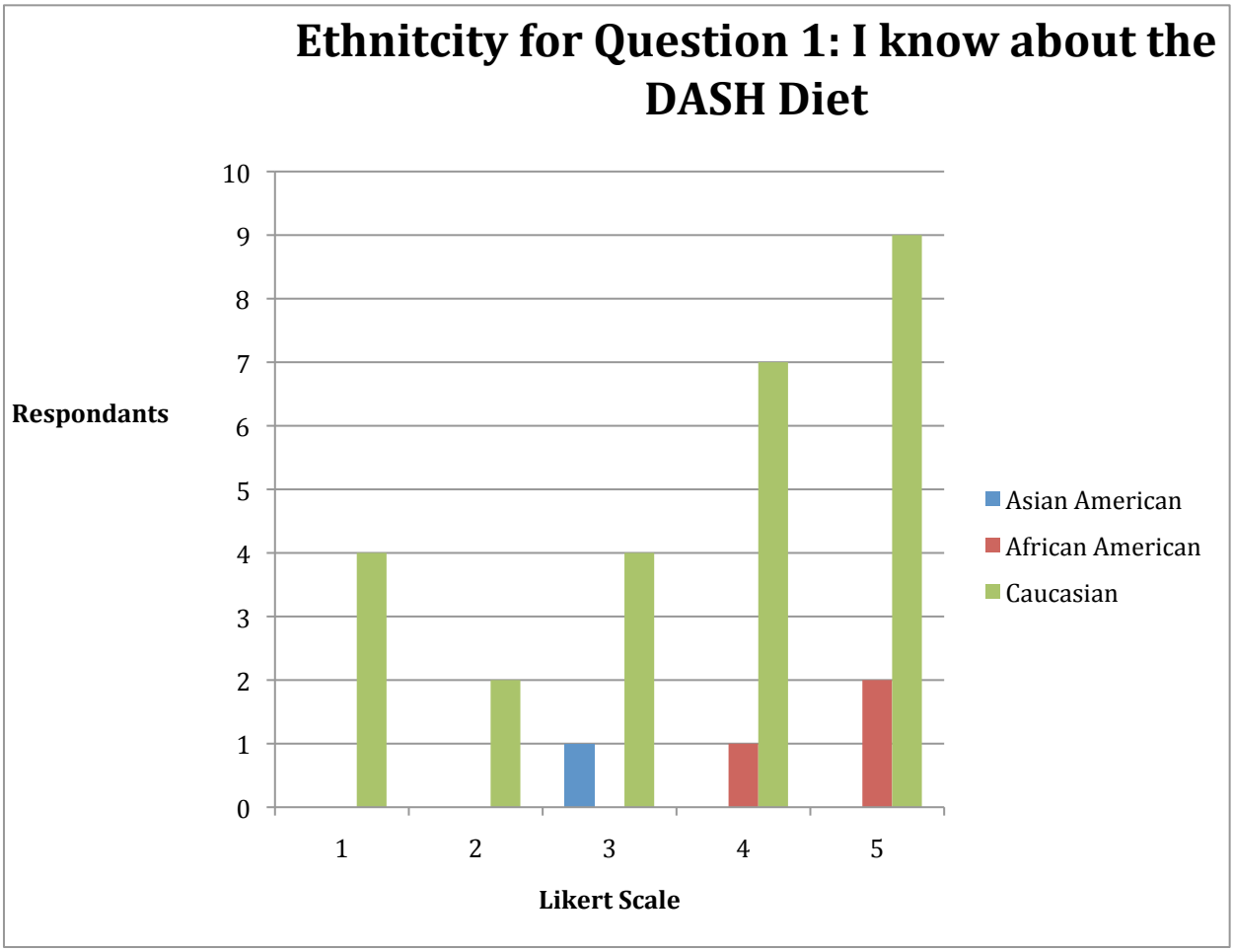
Appendix 11

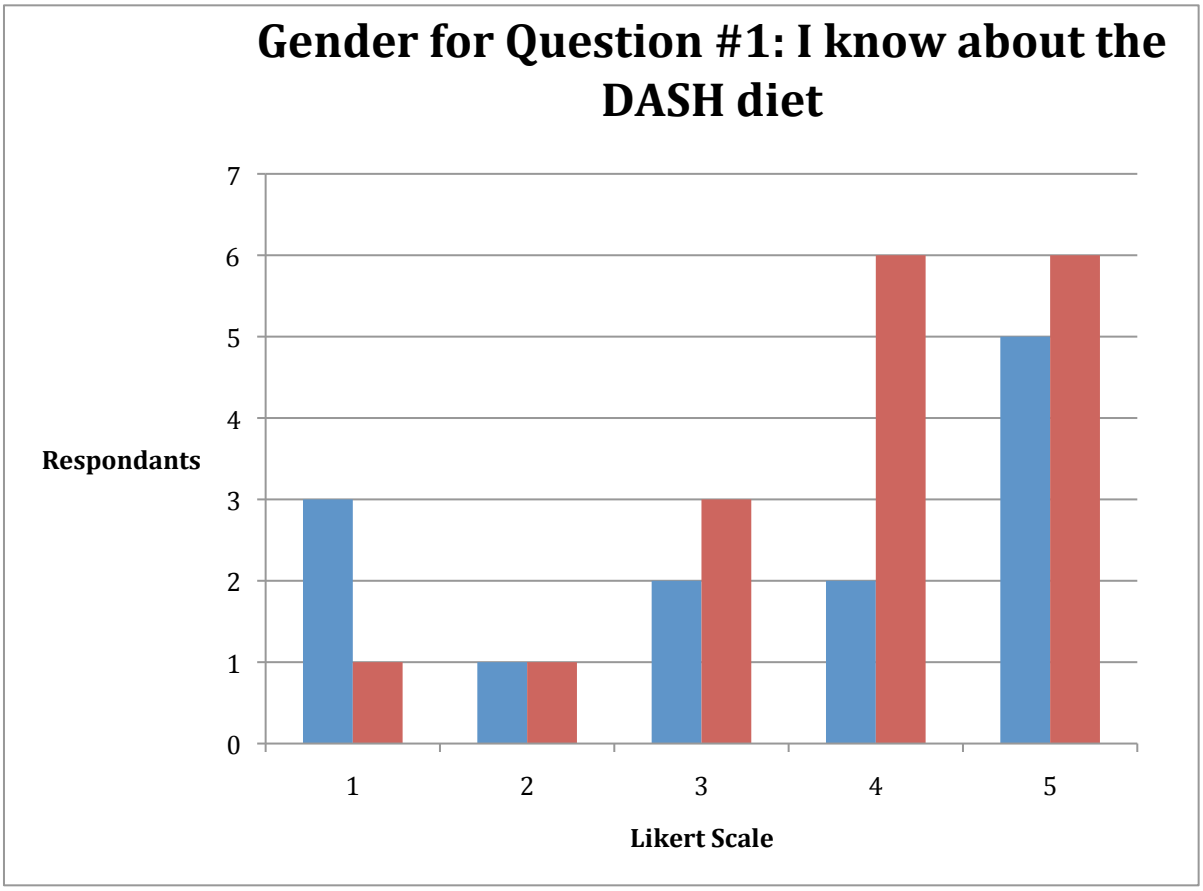
a. Pre-education questionnaire data

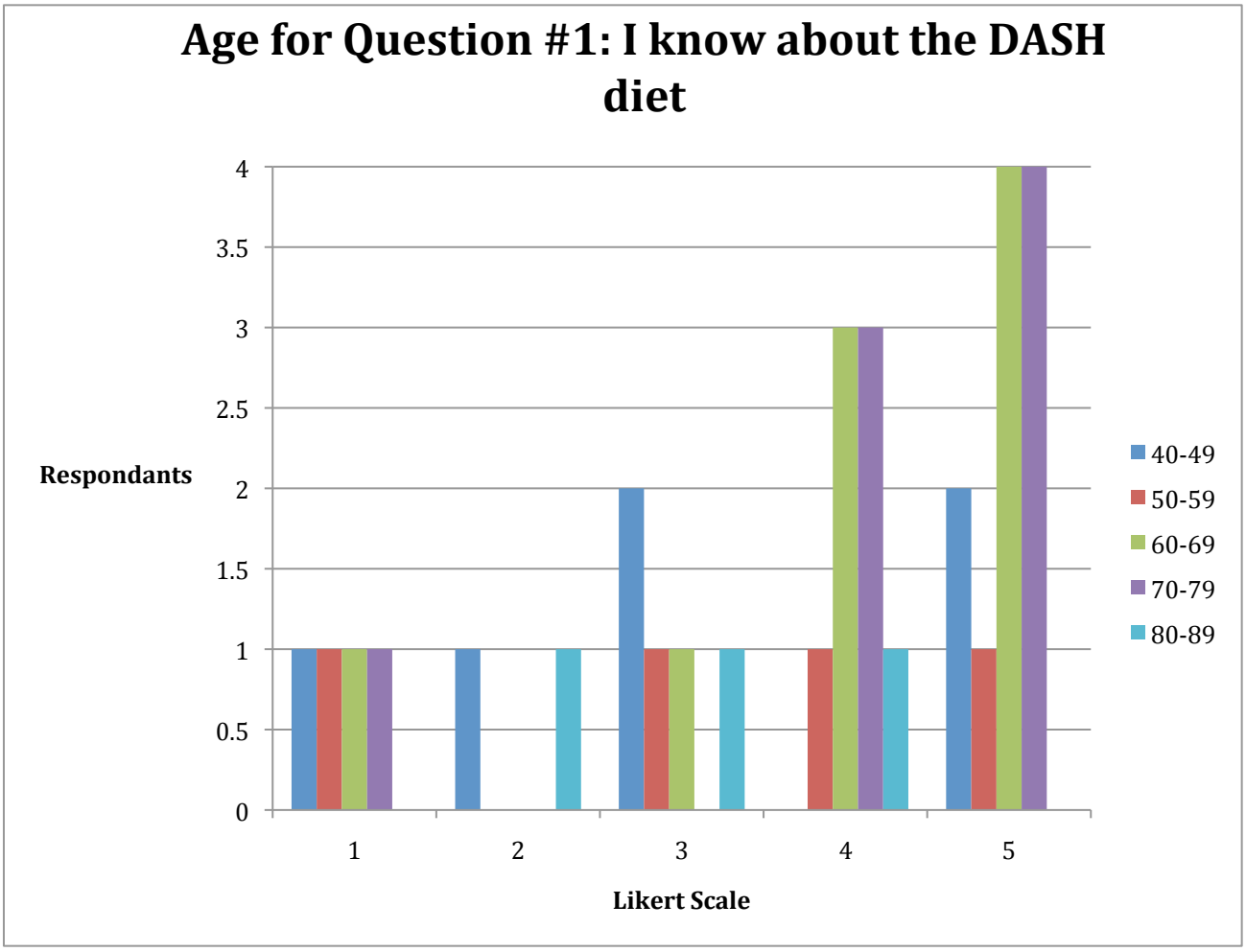


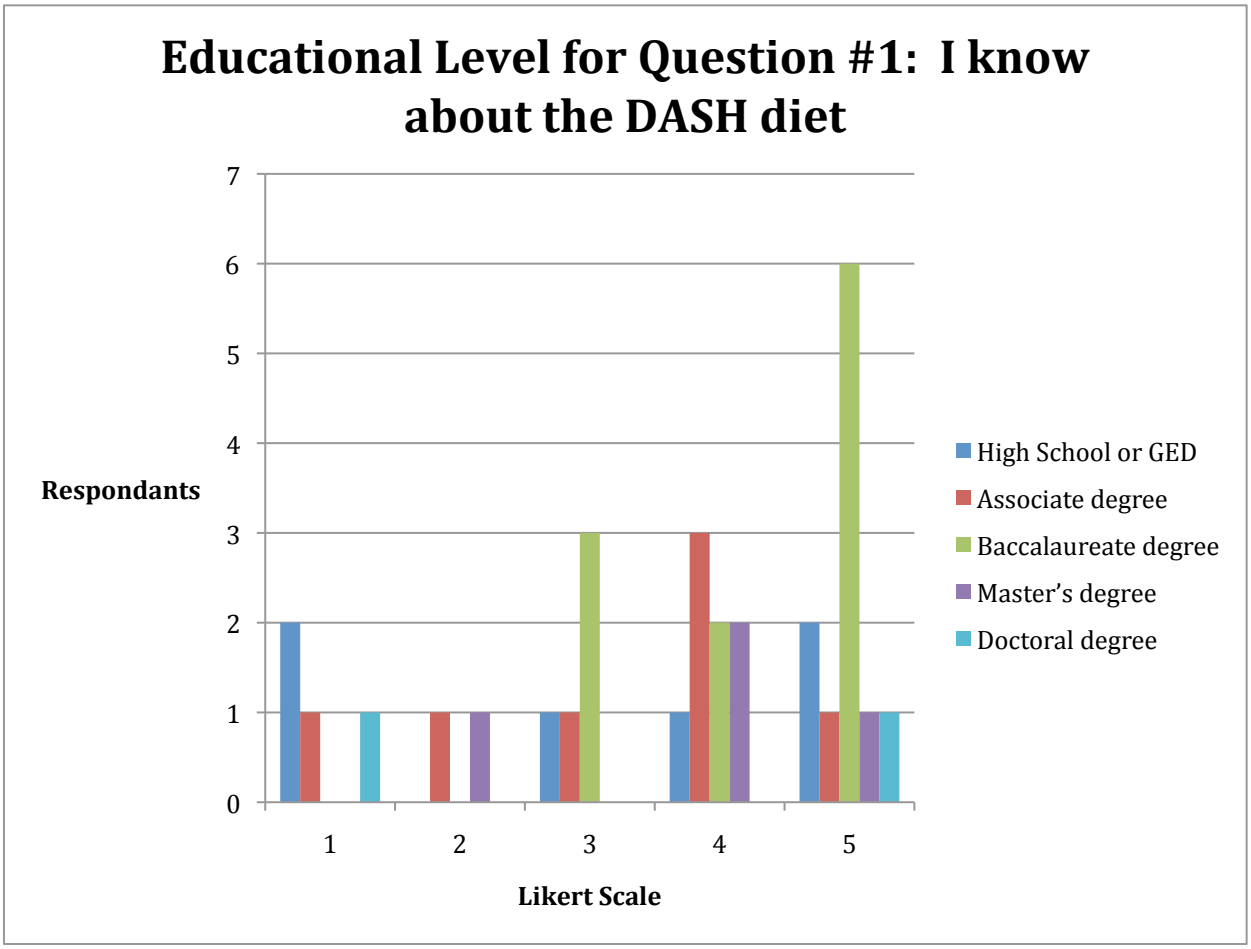


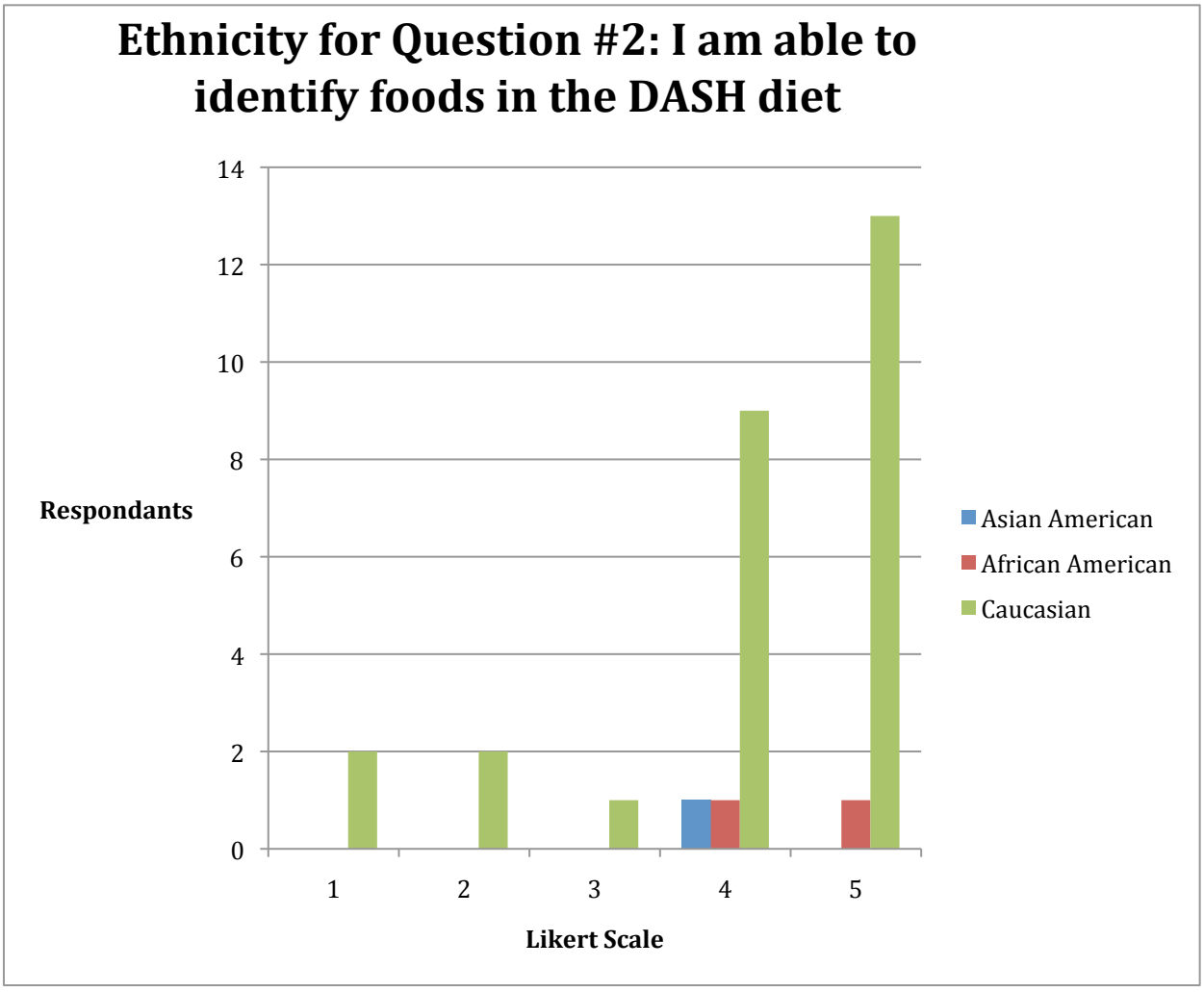
b. Educational questionnaire data (6 questions)

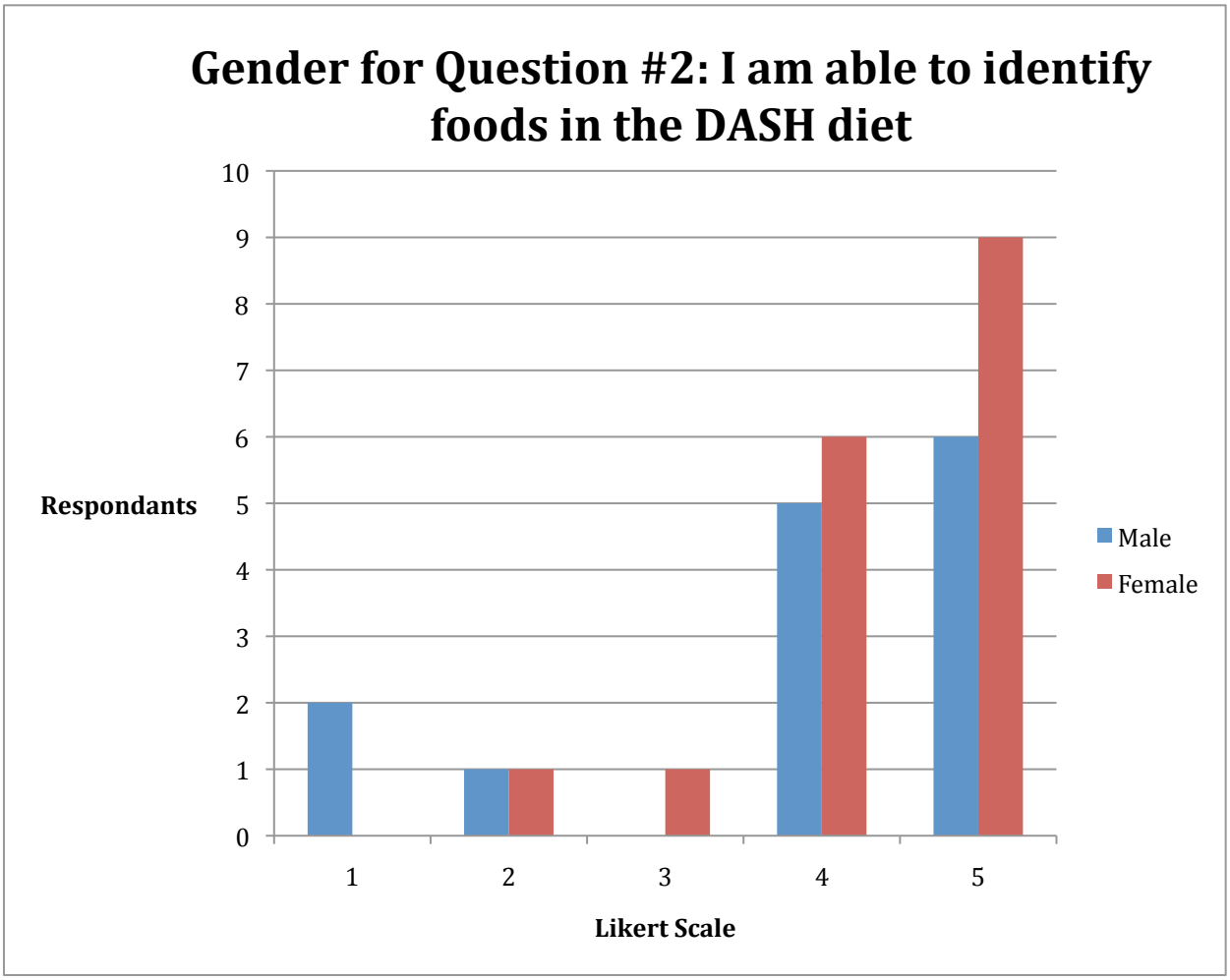

Ethnitcity for Question 1: I know about the DASH Diet
Respondants
10
9
8
7
6
5
4
3
2
1
0
1
2
3
4
5
Likert Scale
Asian American
African American
Caucasian

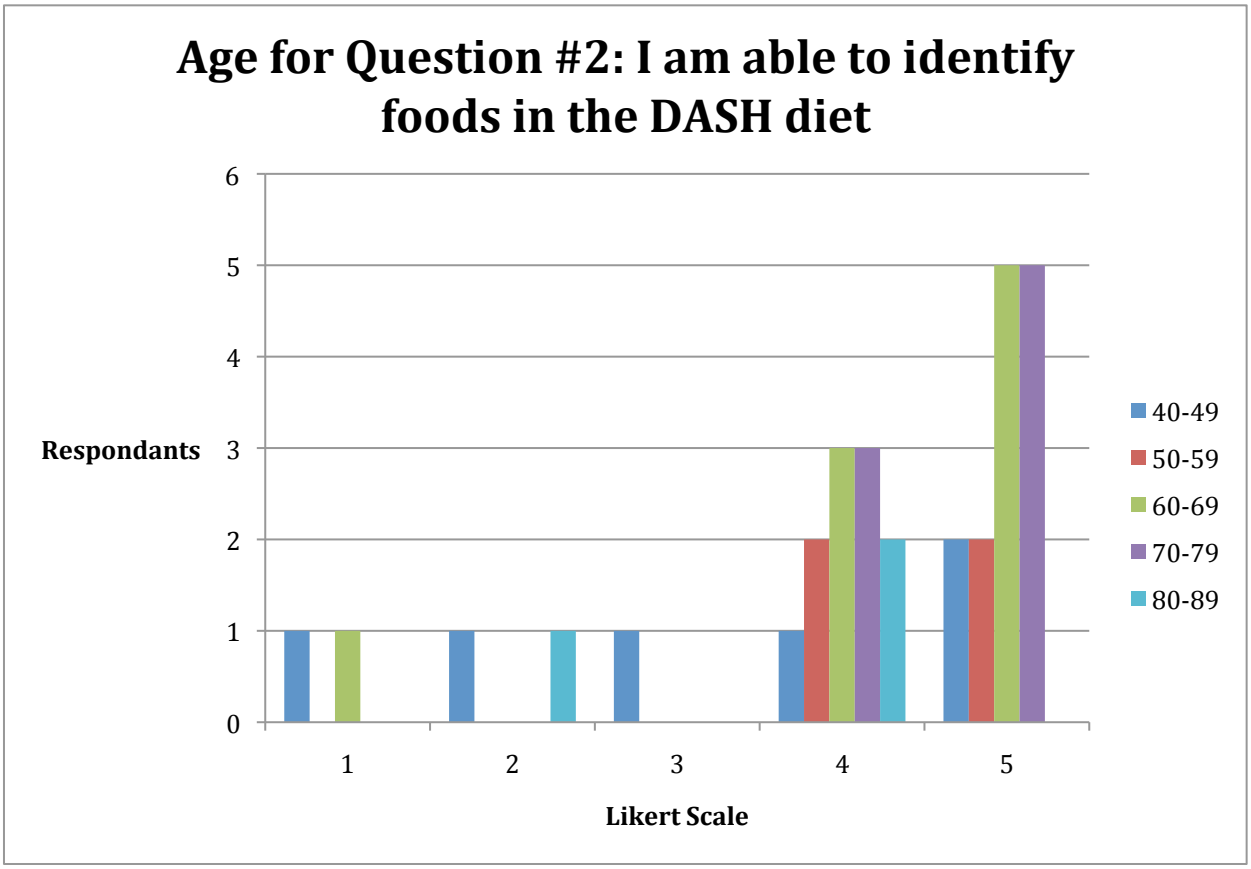

Gender for Question #1: I know about the DASH diet
Respondants
7
6
5
4
3
2
1
0
1
2
3
4
5
Likert Scale

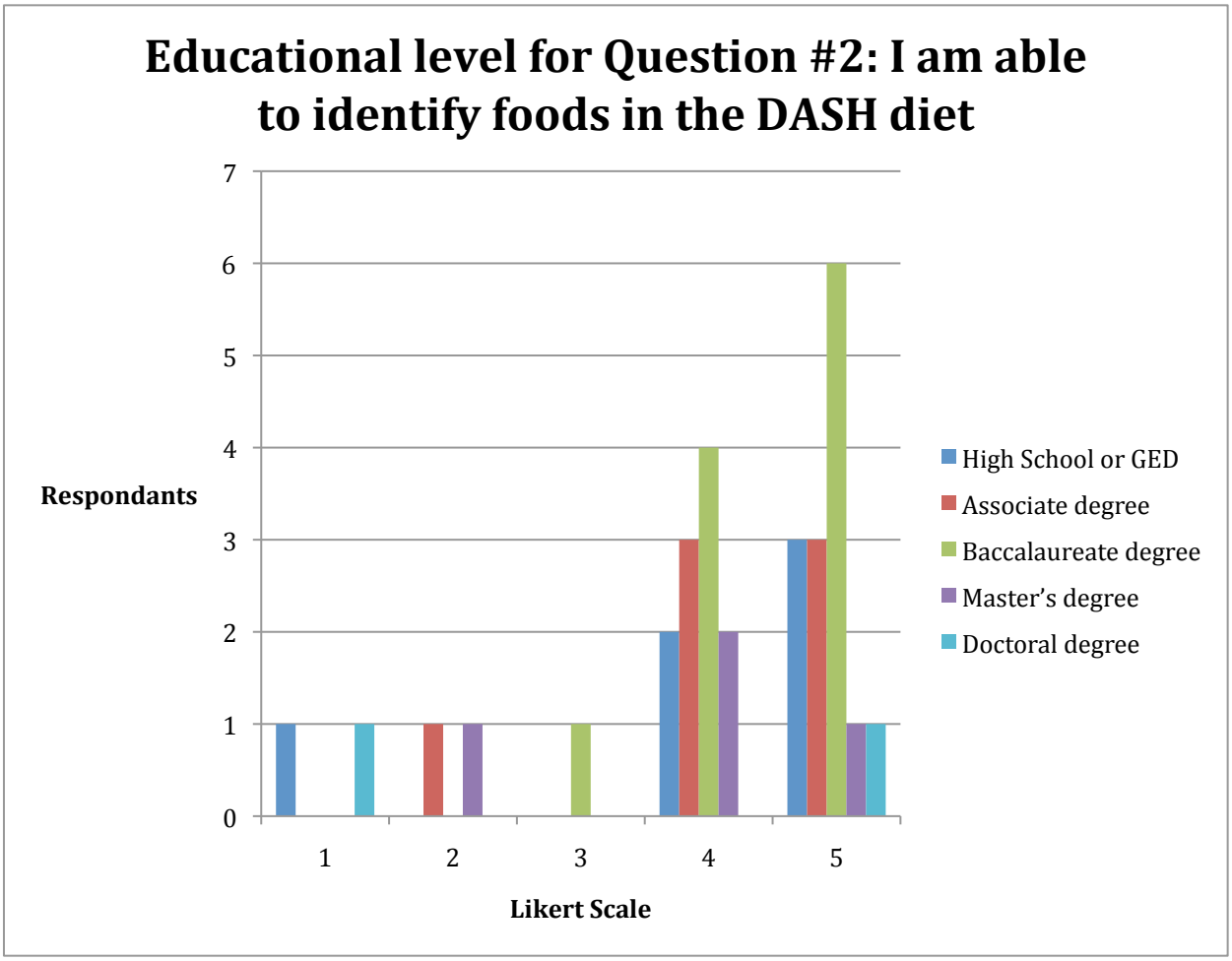

Age for Question #1: I know about the DASH diet
Respondants
4
3.5
3
2.5
2
1.5
1
0.5
0
1
2
3
4
5
Likert Scale
40-49
50-59
60-69
70-79
80-89

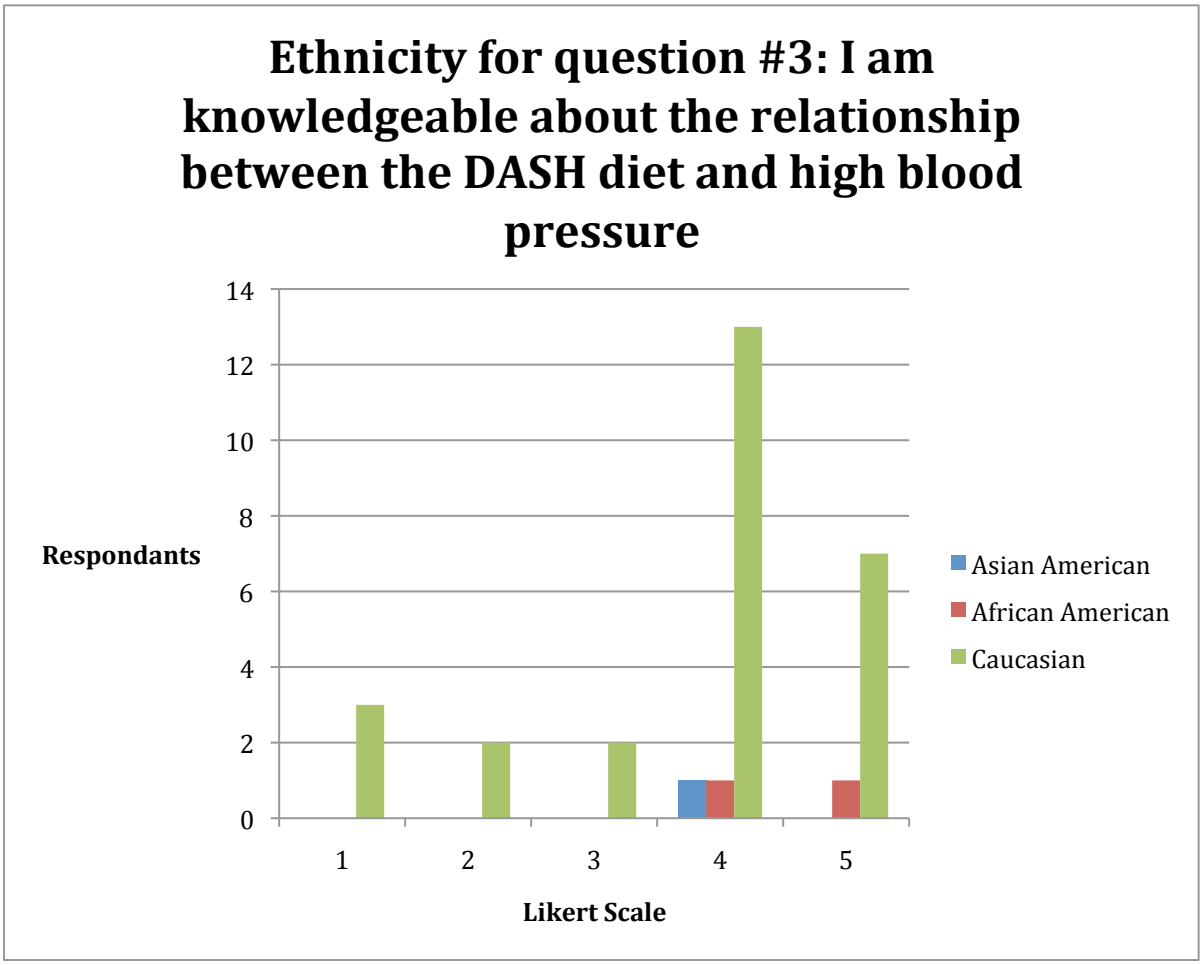

Educational Level for Question #1: I know about the DASH diet
Respondants
0
1
2
3
4
5
6
7
1
2
3
4
5
Likert Scale
High School or GED
Associate degree
Baccalaureate degree
Master's degree
Doctoral degree

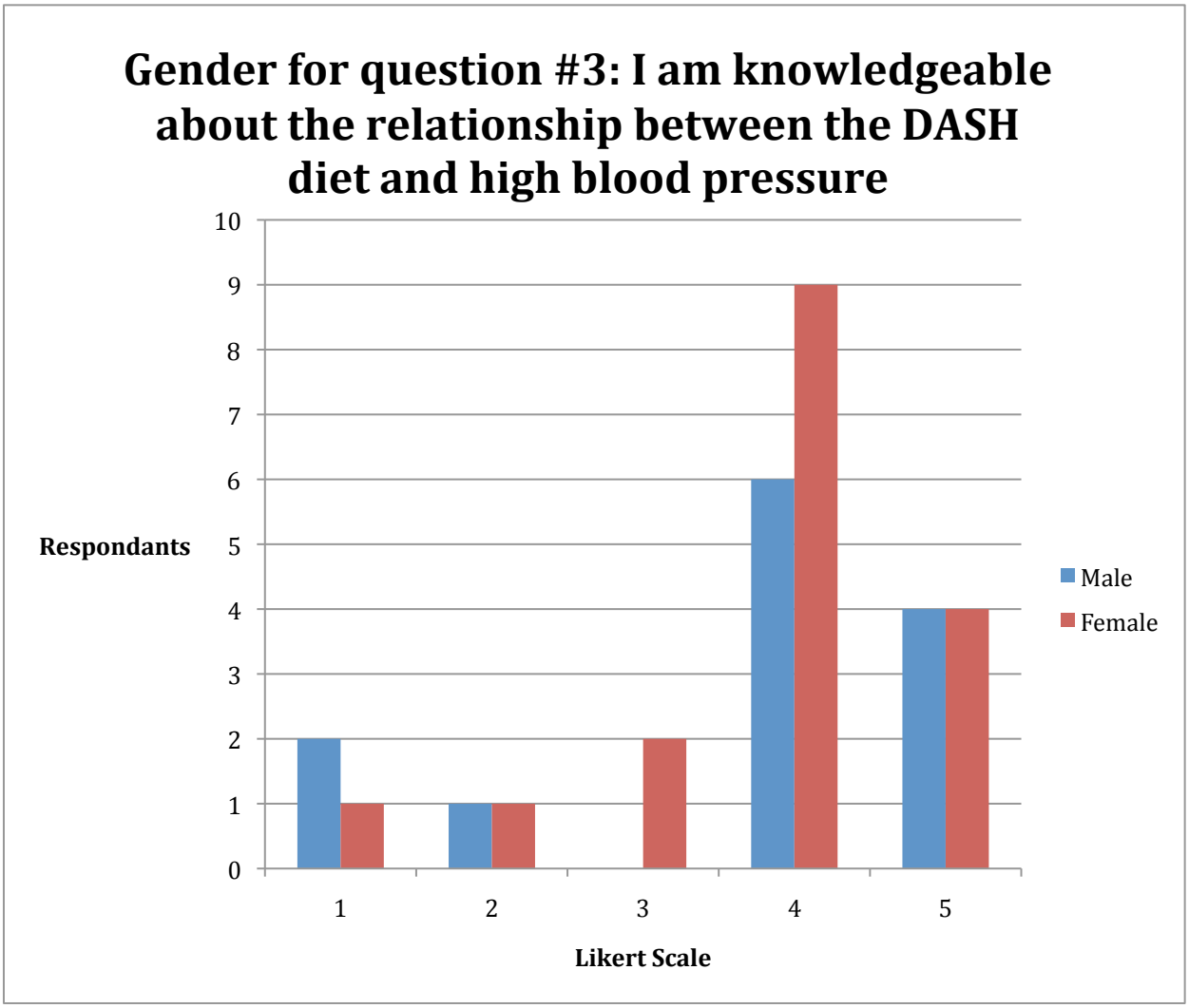

Ethnicity for Question #2: I am able to identify foods in the DASH diet
Respondants
14
12
10
8
6
4
2
0
1
2
3
4
5
Likert Scale
Asian American
African American
Caucasian

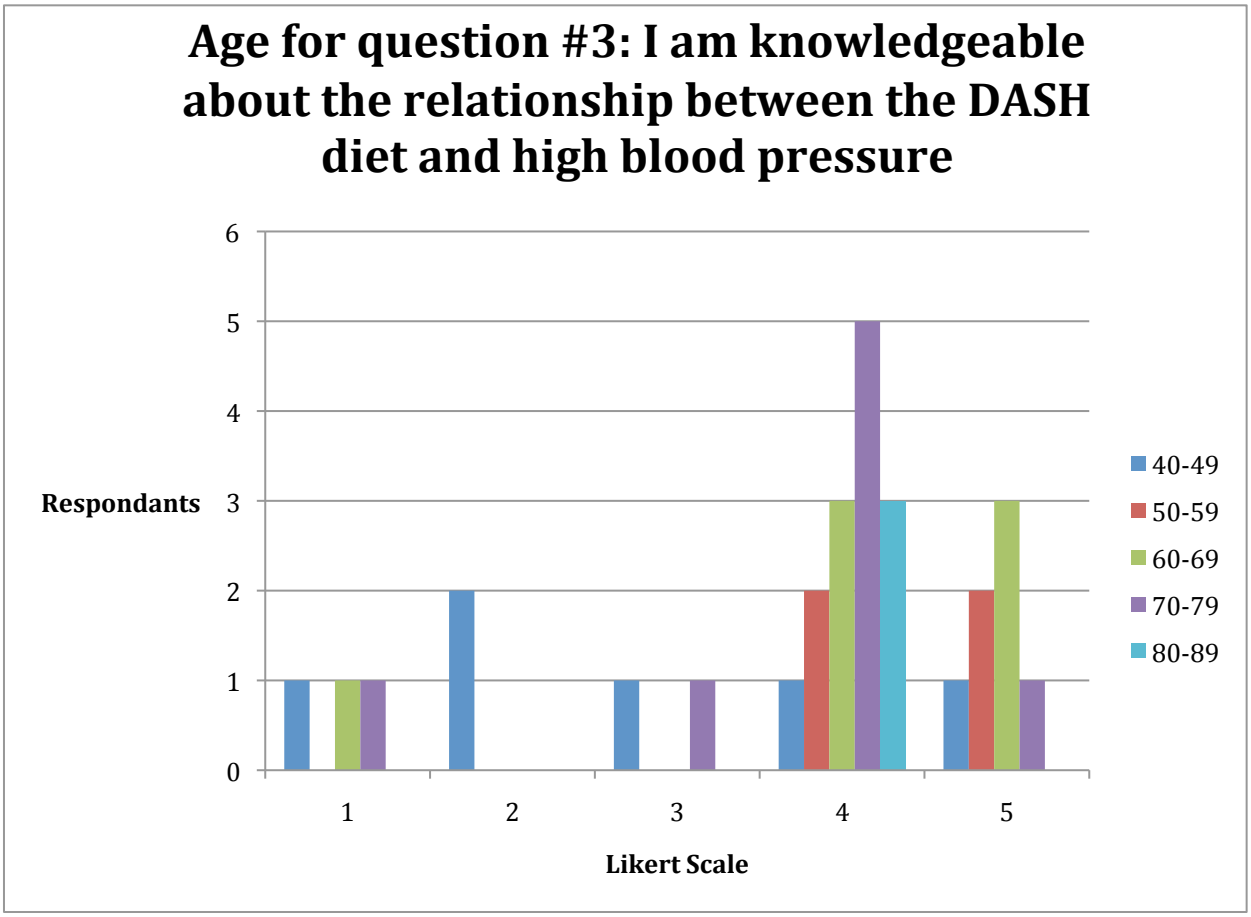

Gender for Question #2: I am able to identify foods in the DASH diet
Respondants
10
9
8
7
6
5
4
3
2
1
0
1
2
3
4
5
Likert Scale
Male
Female

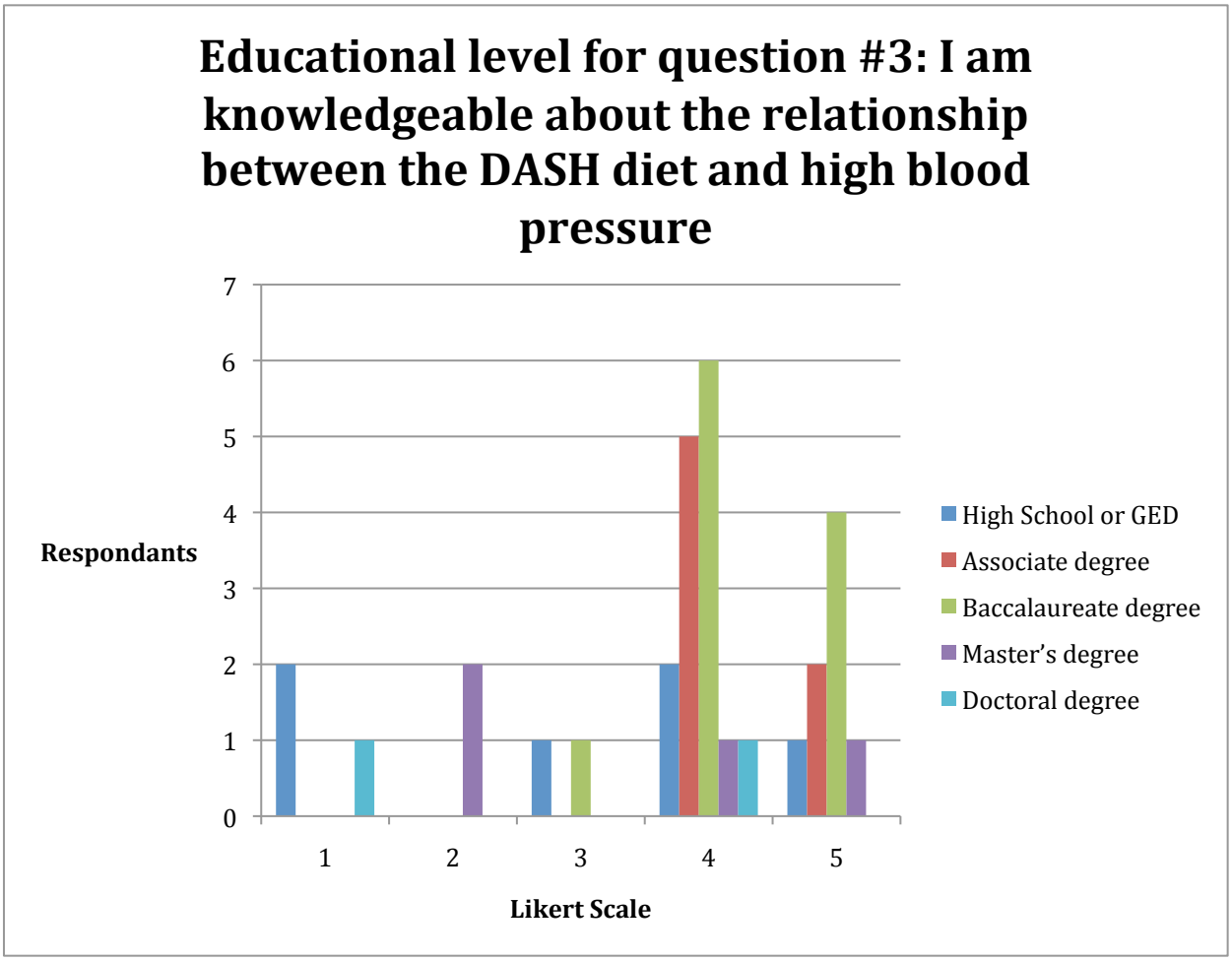

Age for Question #2: I am able to identify foods in the DASH diet
Respondants
0
1
2
3
4
5
6
1
2
3
4
5
Likert Scale
40-49
50-59
60-69
70-79
80-89

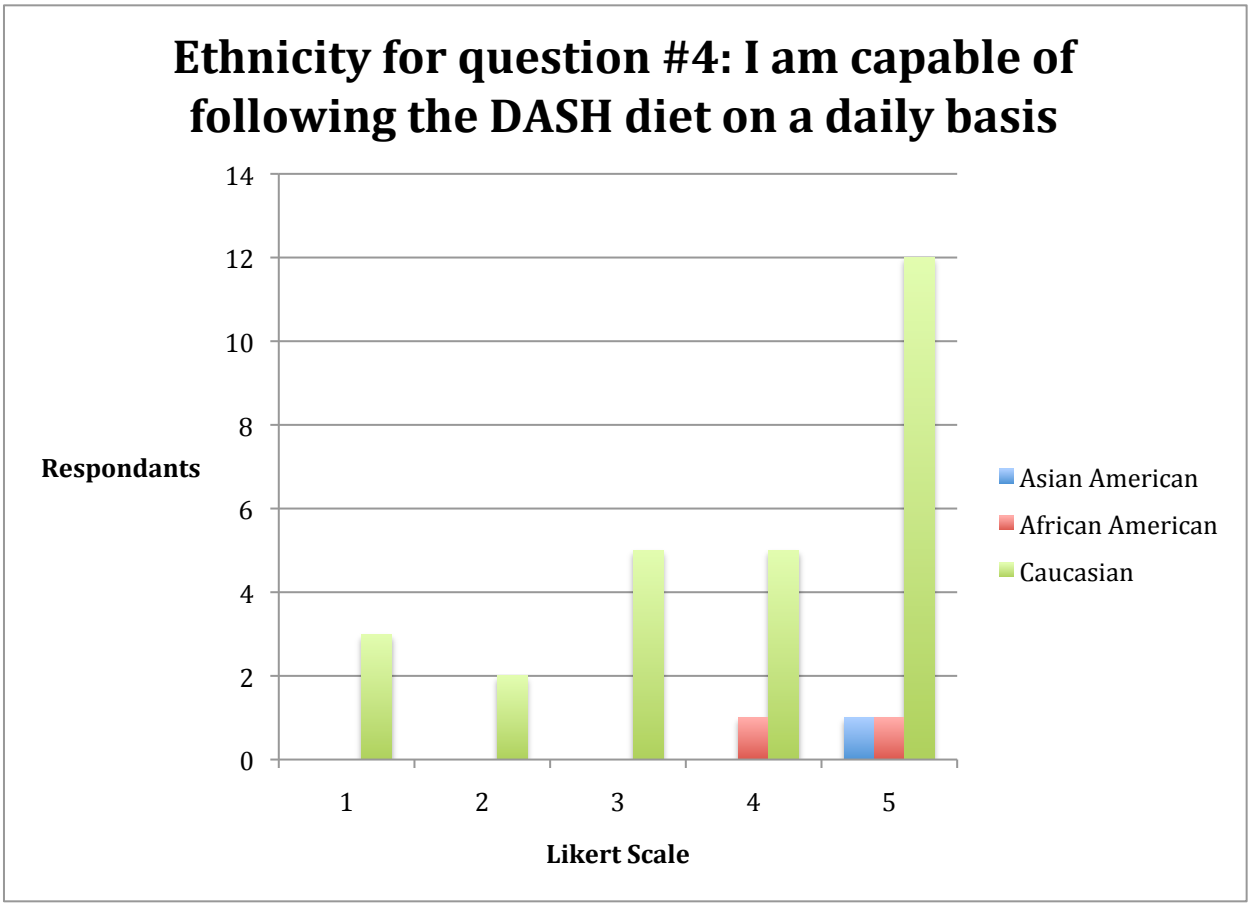

Educational level for Question #2: I am able to identify foods in the DASH diet
Respondants
0
1
2
3
4
5
6
7
1
2
3
4
5
Likert Scale
High School or GED
Associate degree
Baccalaureate degree
Master's degree
Doctoral degree

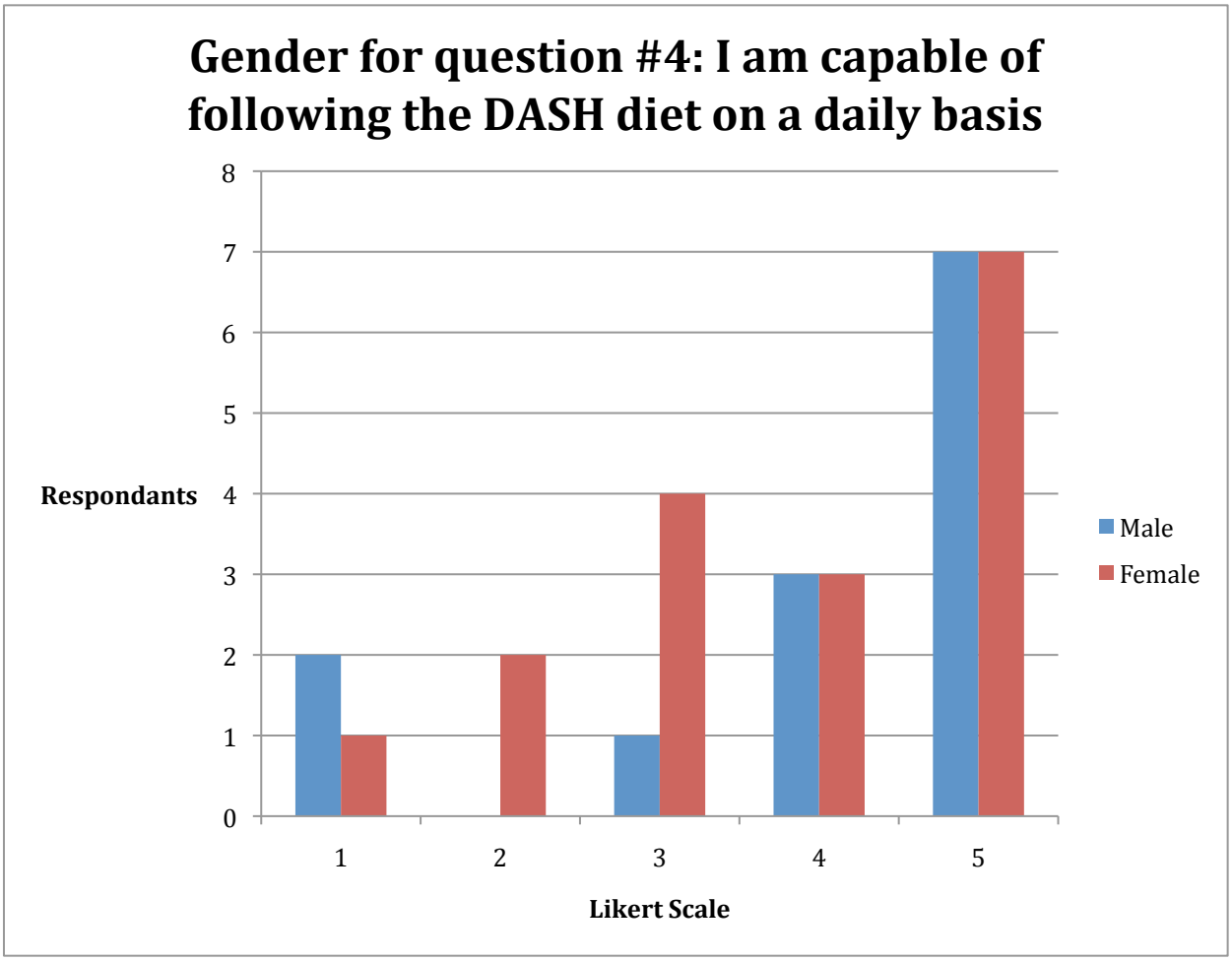

Ethnicity for question #3: I am knowledgeable about the relationship between the DASH diet and high blood pressure
Respondants
14
12
10
8
6
4
2
0
1
2
3
4
5
Likert Scale
Asian American
African American
Caucasian

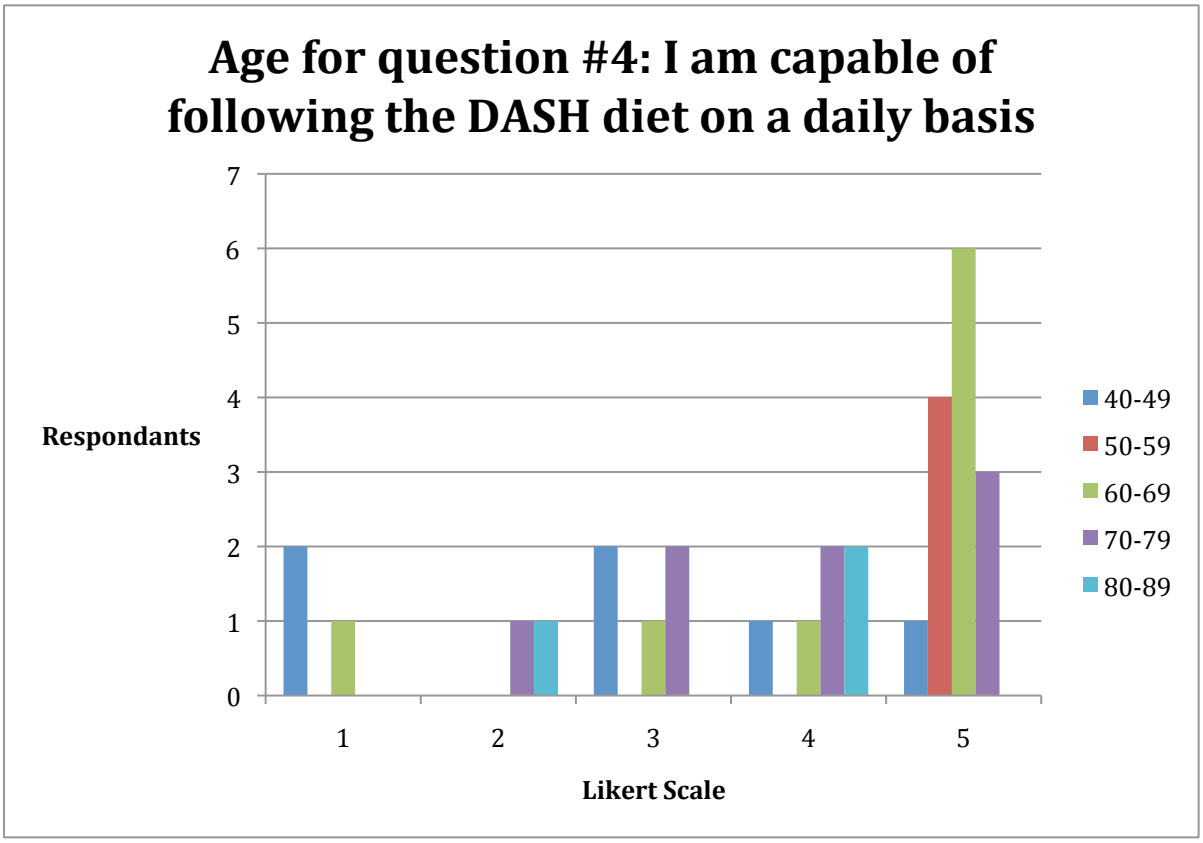

Gender for question #3: I am knowledgeable about the relationship between the DASH diet and high blood pressure
Respondants
10
9
8
7
6
5
4
3
2
1
0
1
2
3
4
5
Likert Scale
Male
Female

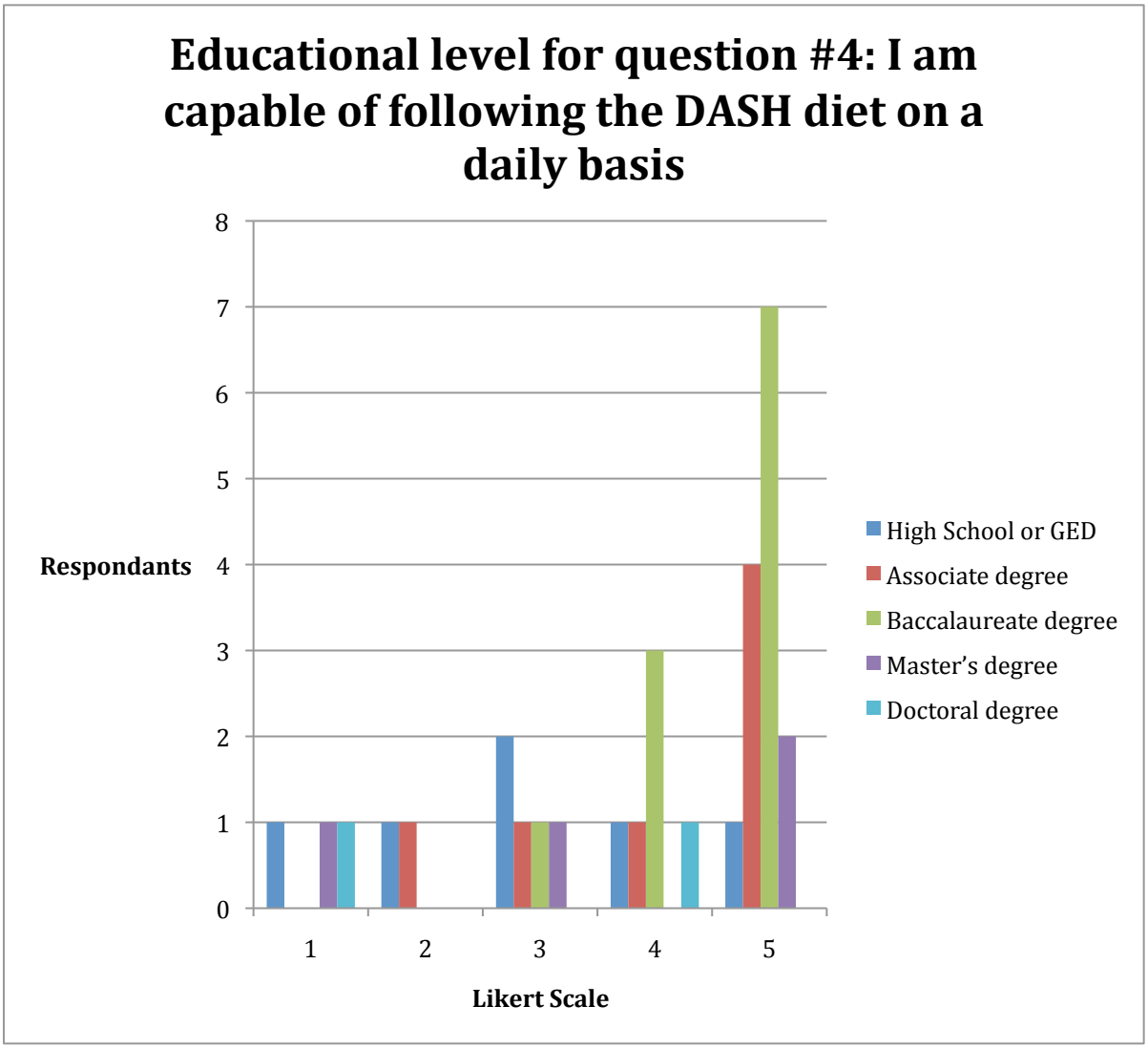

Age for question #3: I am knowledgeable about the relationship between the DASH diet and high blood pressure
Respondants
0
1
2
3
4
5
6
1
2
3
4
5
Likert Scale
40-49
50-59
60-69
70-79
80-89

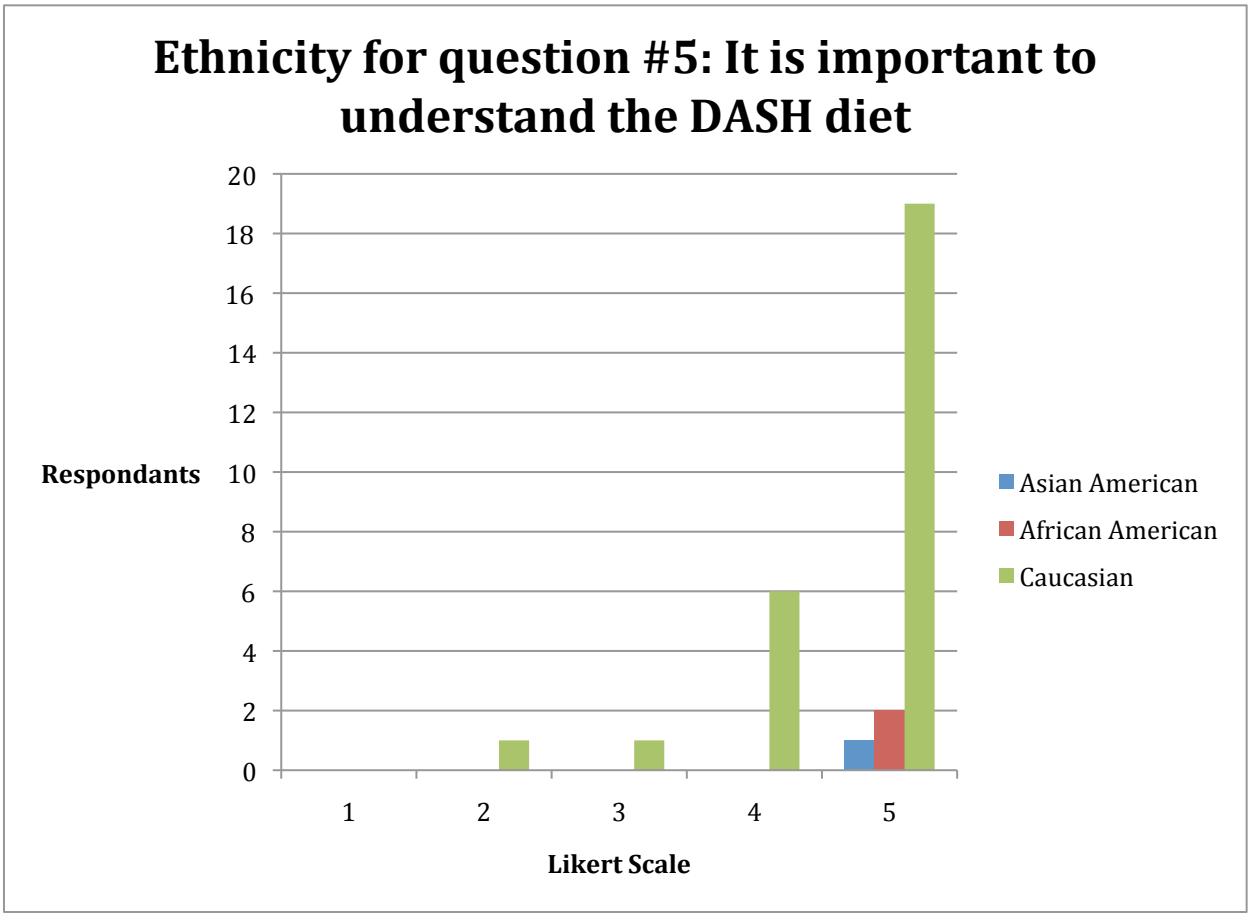

Educational level for question #3: I am knowledgeable about the relationship between the DASH diet and high blood pressure
Respondants
0
1
2
3
4
5
6
7
1
2
3
4
5
Likert Scale
High School or GED
Associate degree
Baccalaureate degree
Master's degree
Doctoral degree

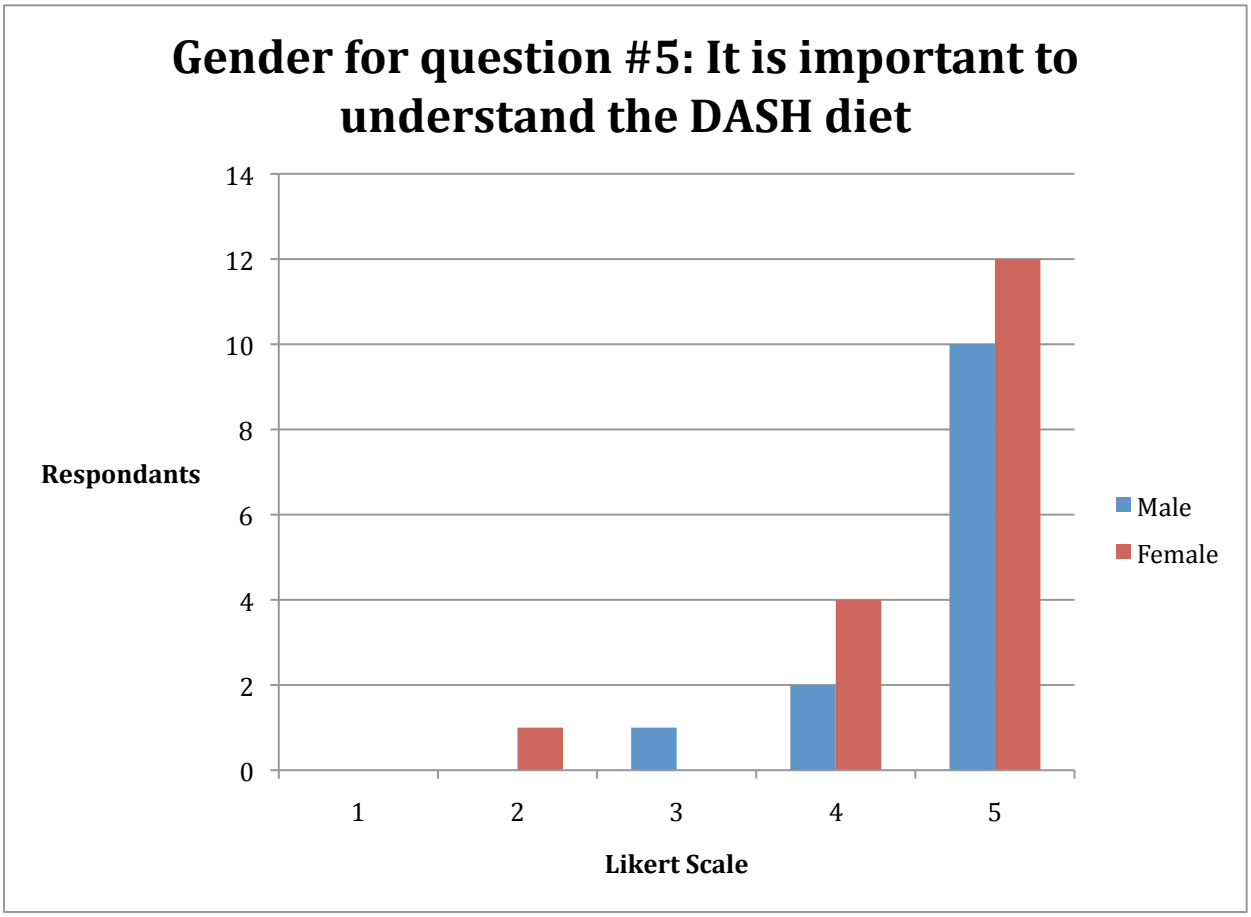

Ethnicity for question #4: I am capable of following the DASH diet on a daily basis
Respondants
14
12
10
8
6
4
2
0
1
2
3
4
5
Likert Scale
Asian American
African American
Caucasian

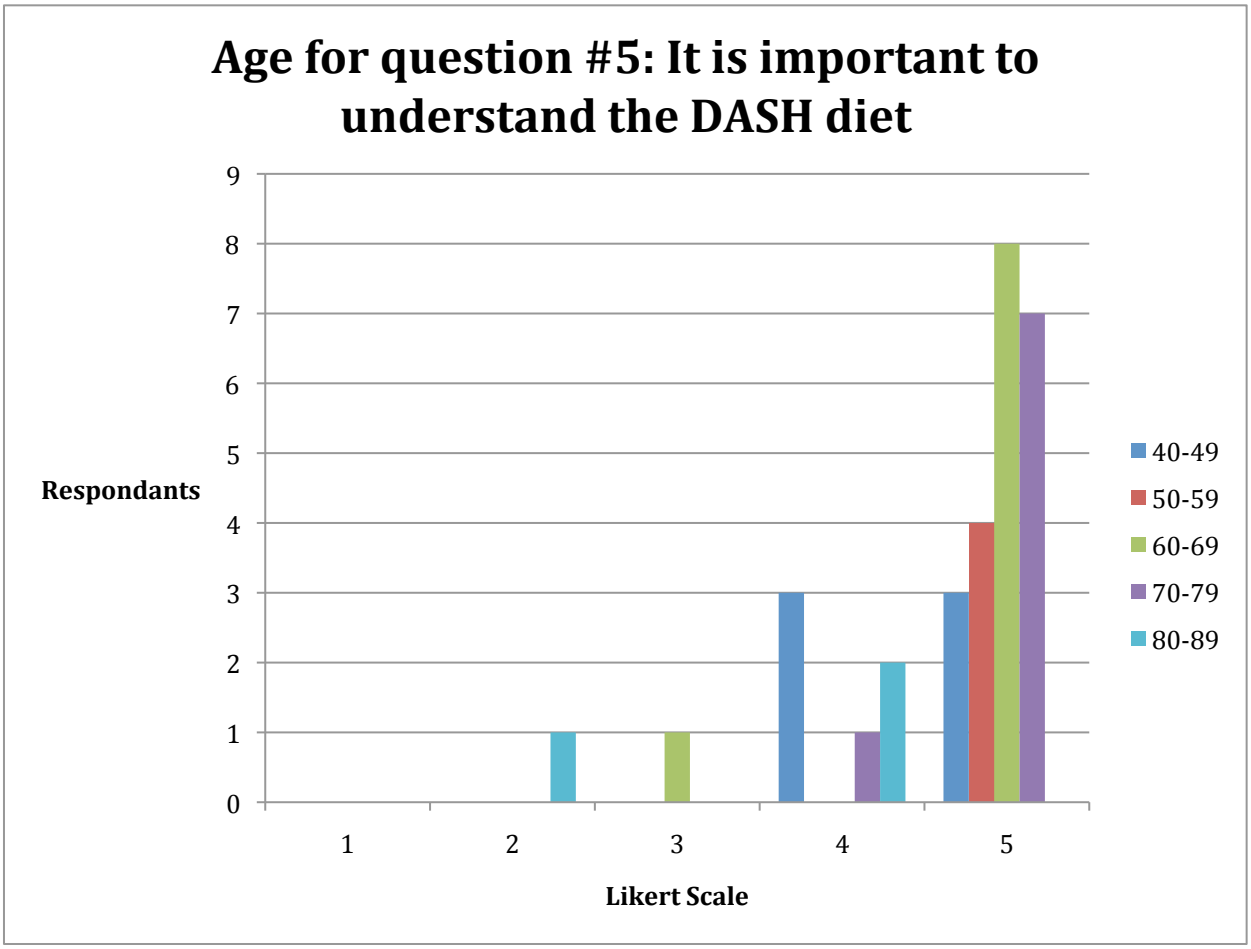

Gender for question #4: I am capable of following the DASH diet on a daily basis
Respondants
0
1
2
3
4
5
6
7
8
1
2
3
4
5
Likert Scale
Male
Female

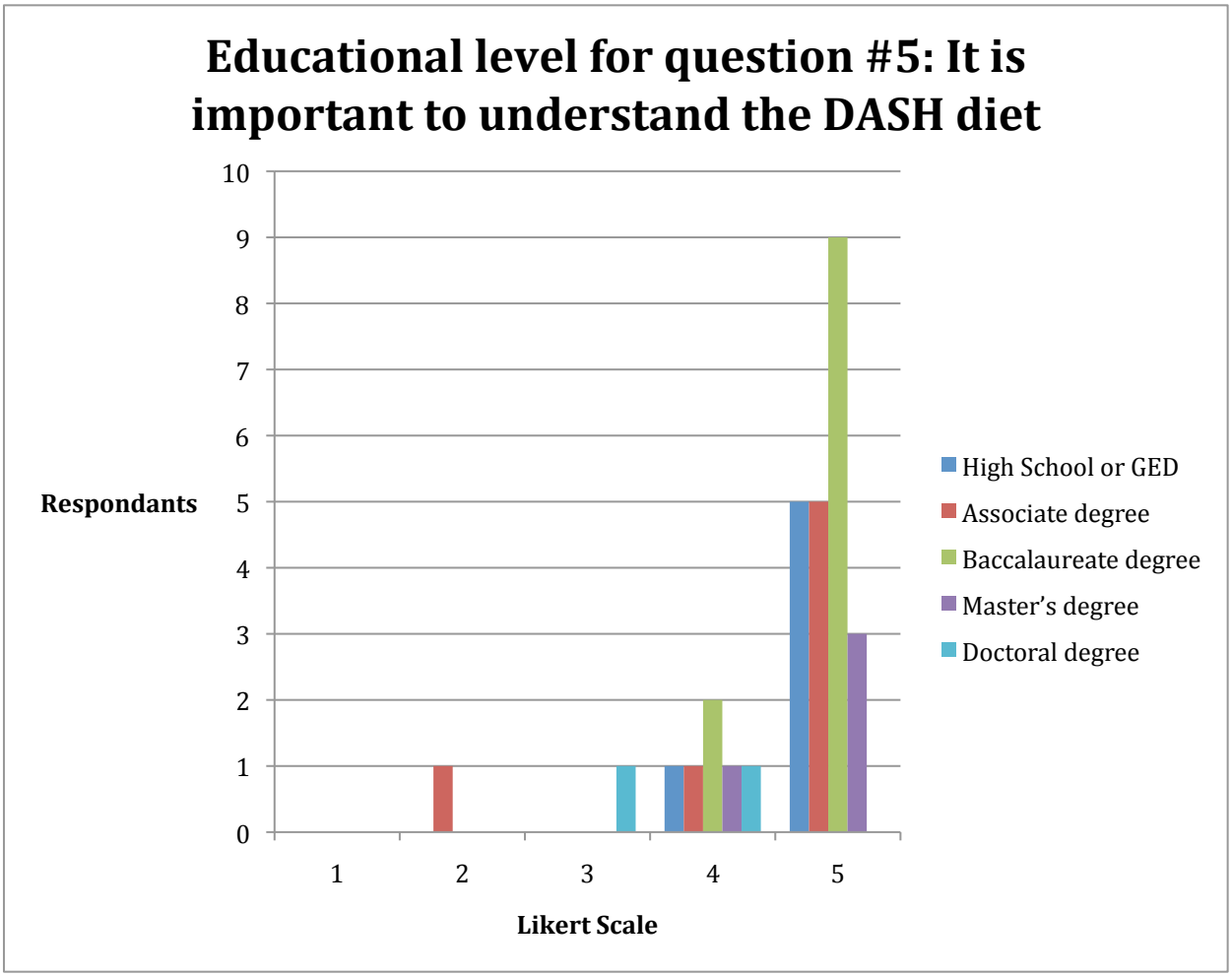

Age for question #4: I am capable of following the DASH diet on a daily basis
Respondants
0
1
2
3
4
5
6
7
1
2
3
4
5
Likert Scale
40-49
50-59
60-69
70-79
80-89

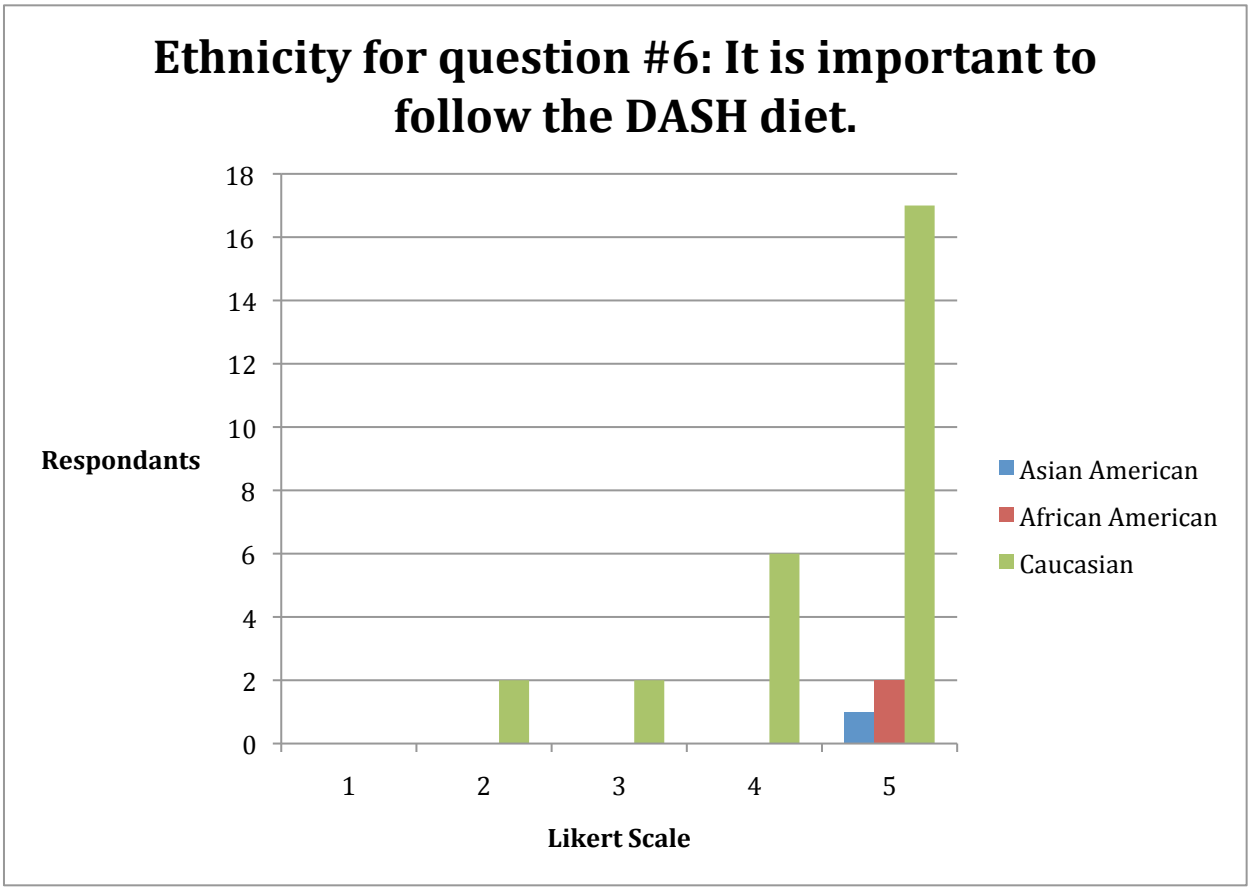

Educational level for question #4: I am capable of following the DASH diet on a daily basis
Respondants
0
1
2
3
4
5
6
7
8
1
2
3
4
5
Likert Scale
High School or GED
Associate degree
Baccalaureate degree
Master's degree
Doctoral degree

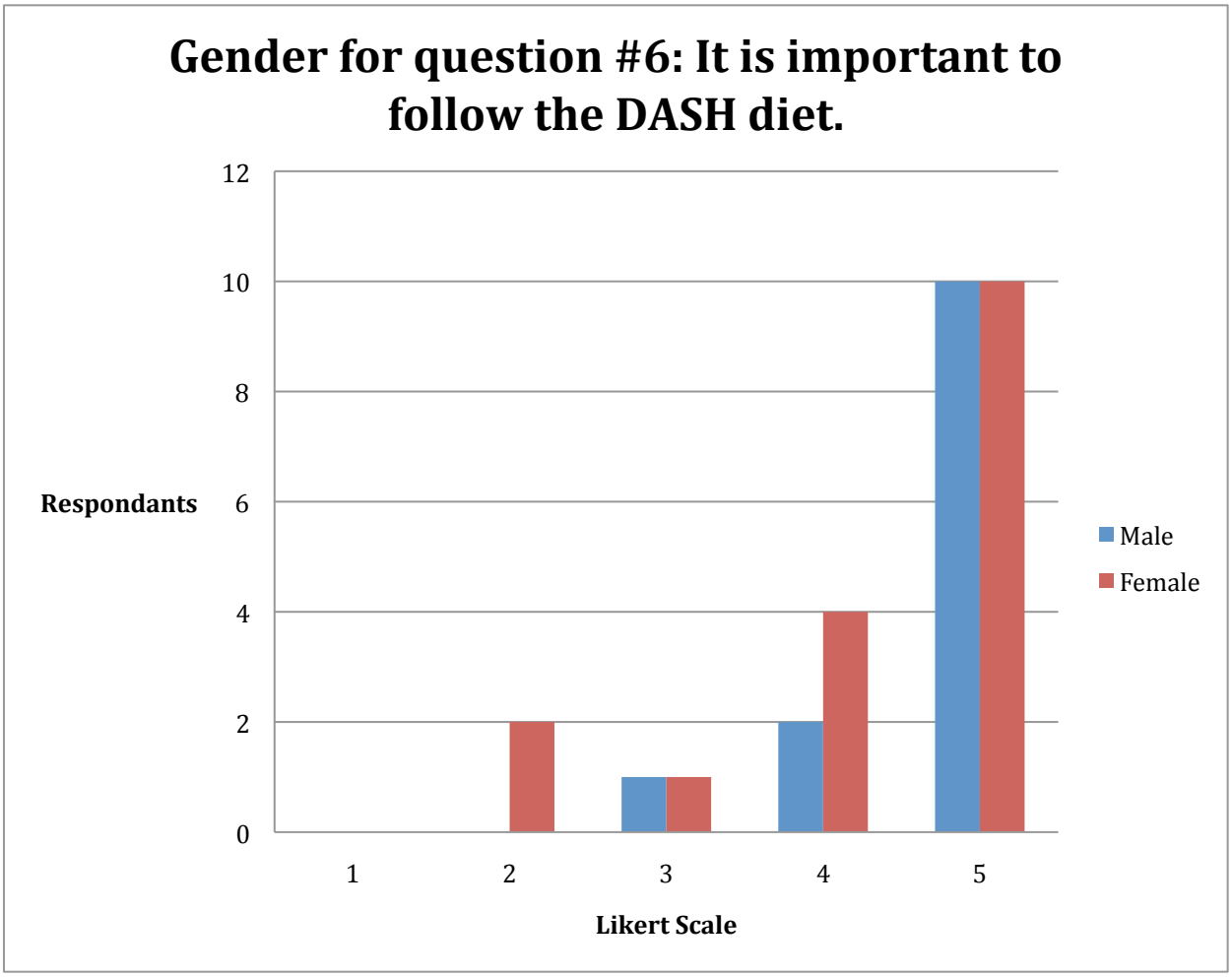

Ethnicity for question #5: It is important to understand the DASH diet
Respondants
20
18
16
14
12
10
8
6
4
2
0
1
2
3
4
5
Likert Scale
Asian American
African American
Caucasian

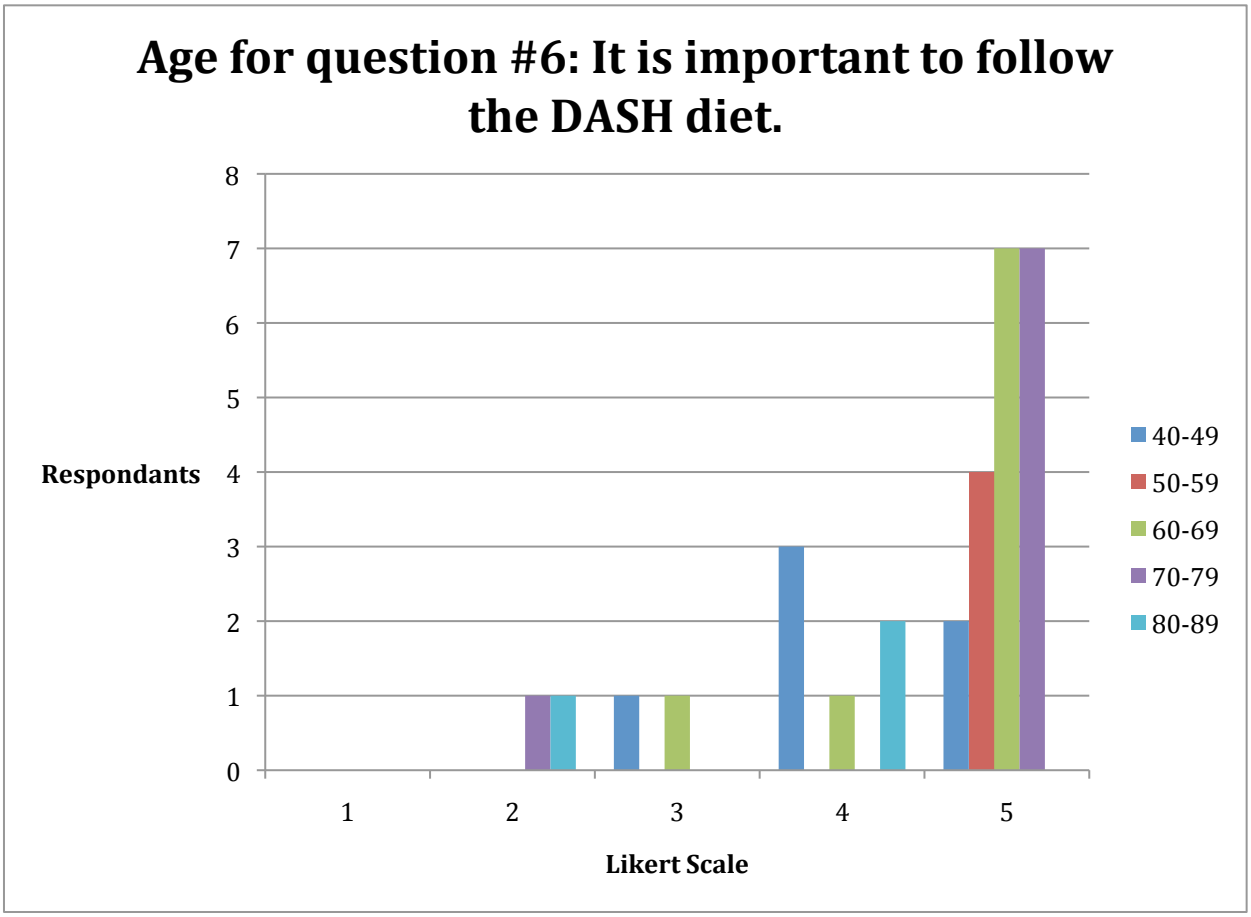

Gender for question #5: It is important to understand the DASH diet
Respondants
14
12
10
8
6
4
2
0
1
2
3
4
5
Likert Scale
Male
Female

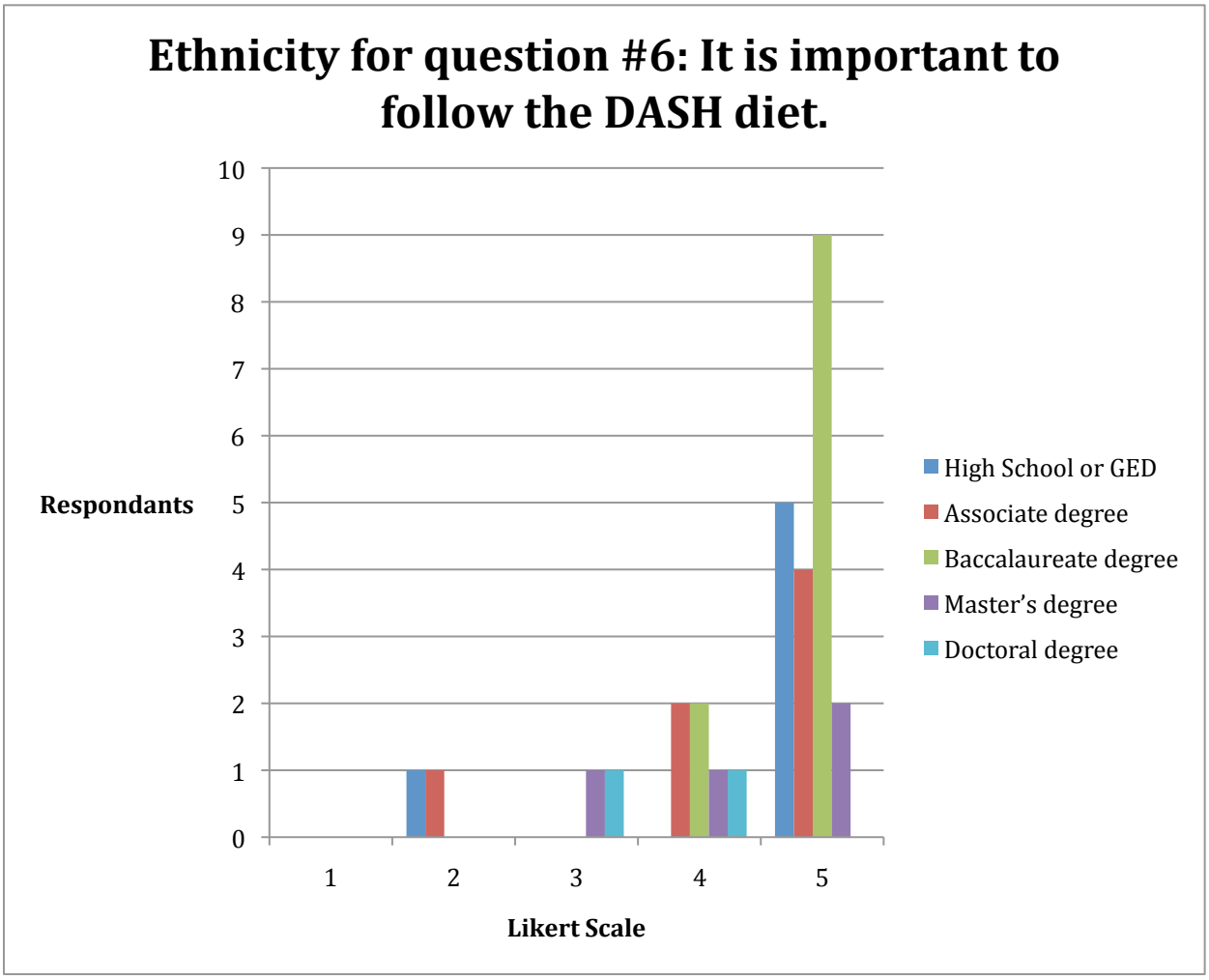

Age for question #5: It is important to understand the DASH diet
Respondants
0
1
2
3
4
5
6
7
8
9
1
2
3
4
5
Likert Scale
40-49
50-59
60-69
70-79
80-89


Educational level for question #5: It is important to understand the DASH diet
Respondants
10
9
8
7
6
5
4
3
2
1
0
1
2
3
4
5
Likert Scale
High School or GED
Associate degree
Baccalaureate degree
Master's degree
Doctoral degree

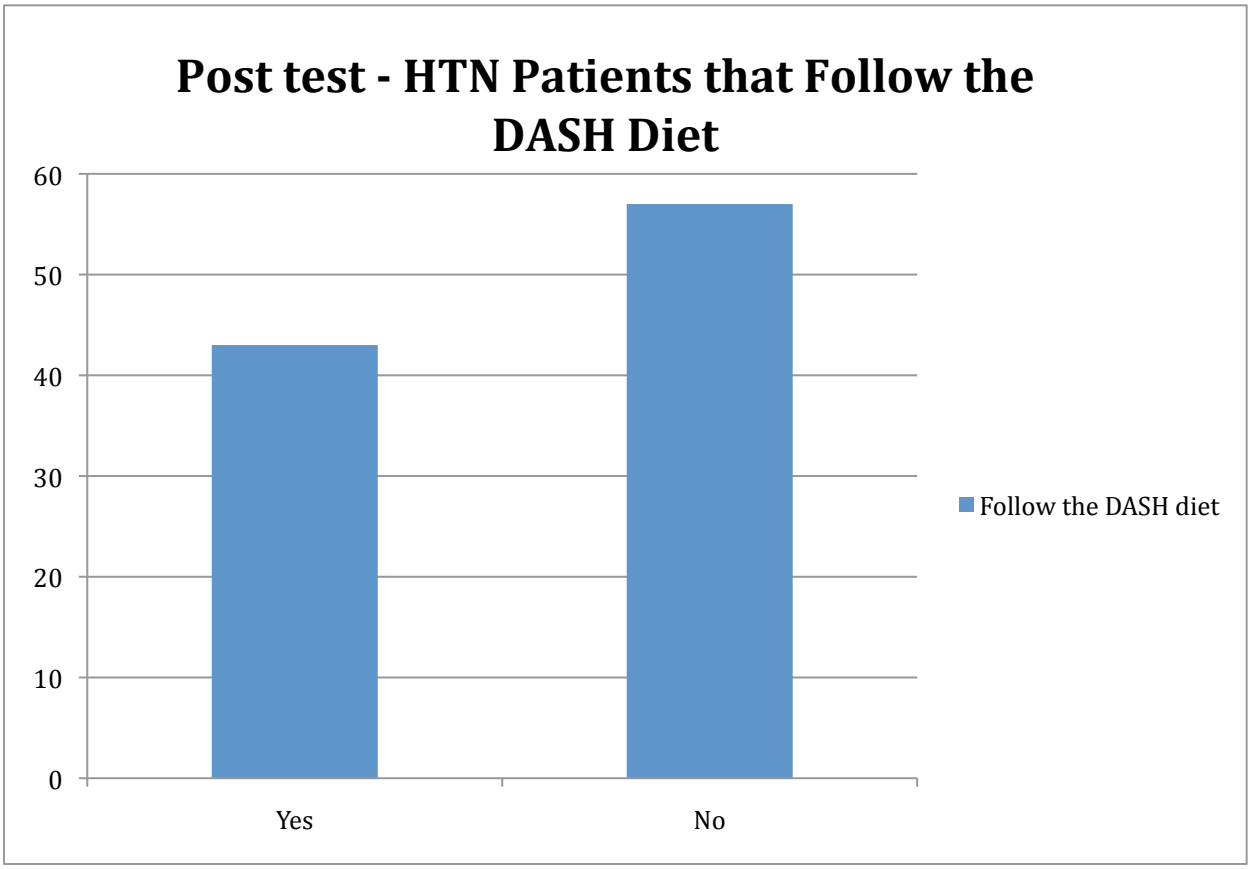

Ethnicity for question #6: It is important to follow the DASH diet.
Respondants
18
16
14
12
10
8
6
4
2
0
1
2
3
4
5
Likert Scale
Asian American
African American
Caucasian

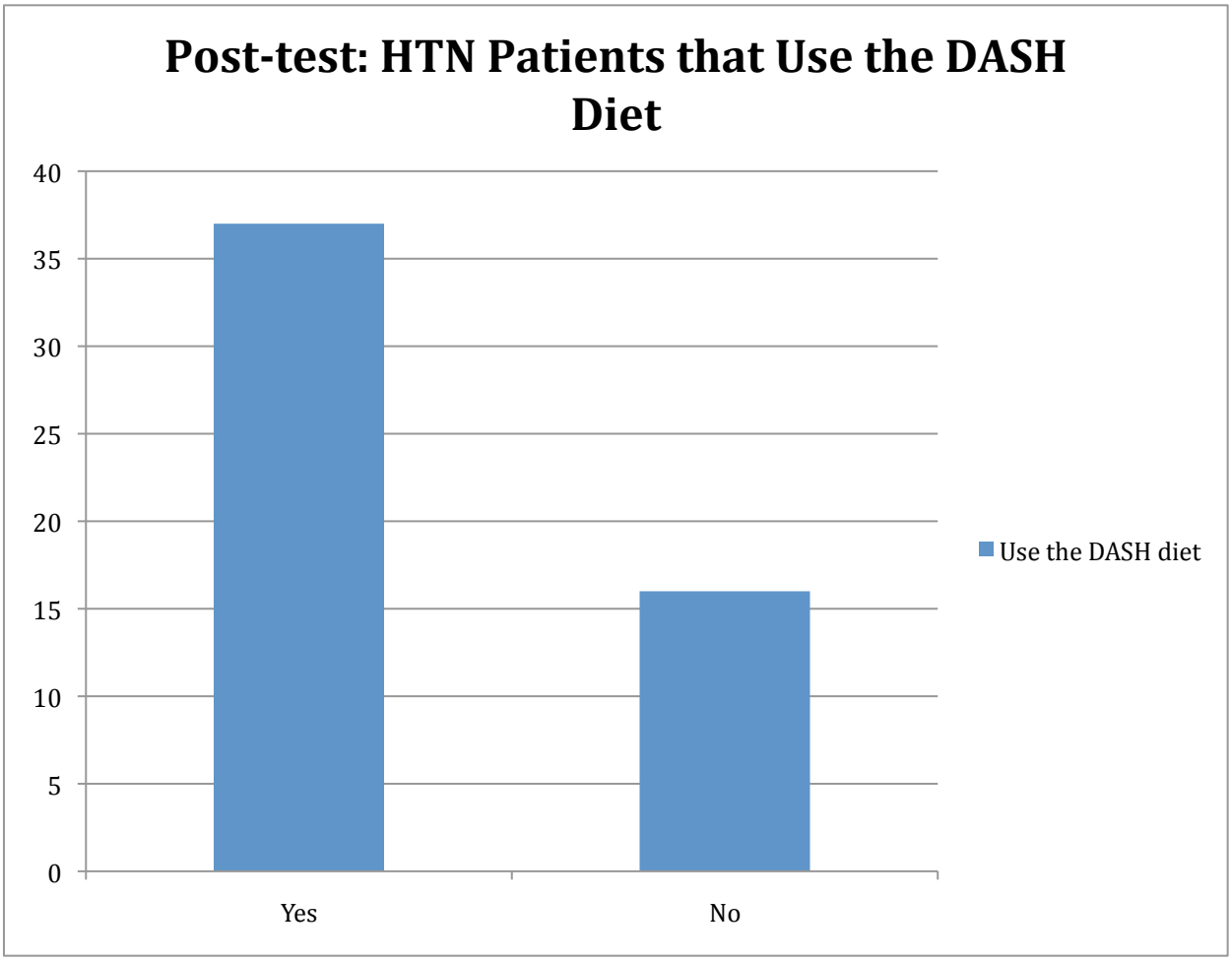

Gender for question #6: It is important to follow the DASH diet.
Respondants
12
10
8
6
4
2
0
1
2
3
4
5
Likert Scale
Male
Female


Age for question #6: It is important to follow the DASH diet.
Respondants
0
1
2
3
4
5
6
7
8
1
2
3
4
5
Likert Scale
40-49
50-59
60-69
70-79
80-89

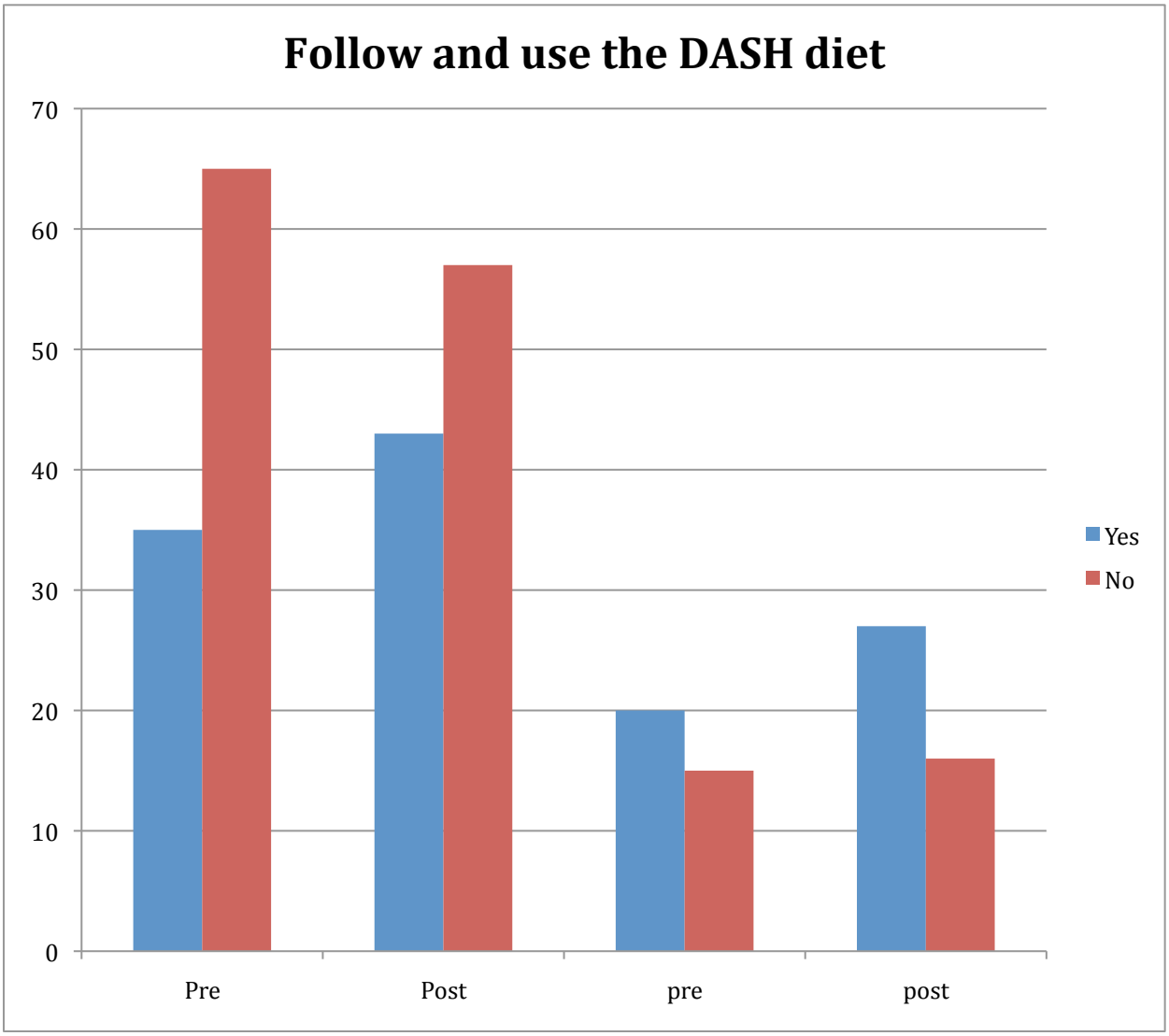


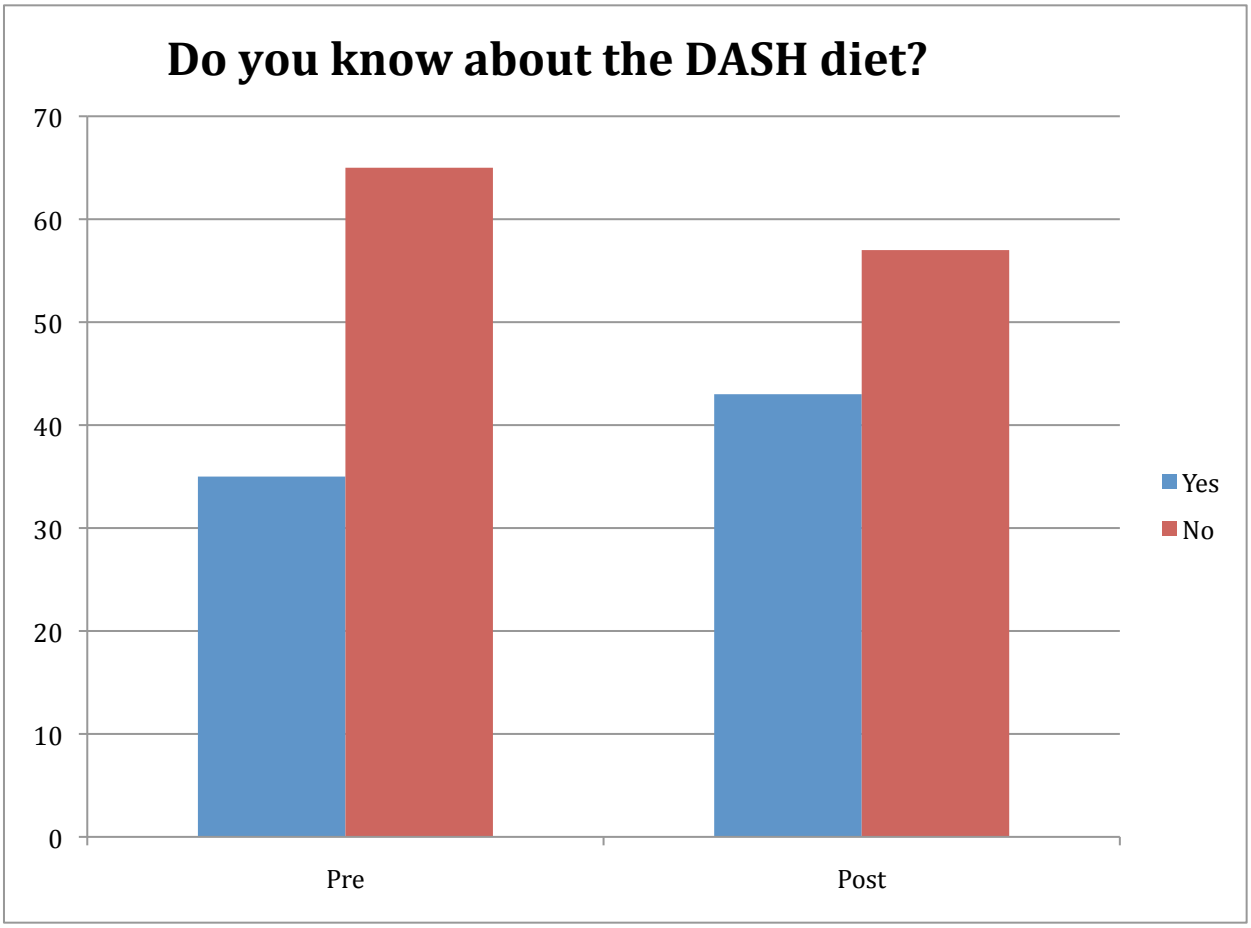
c. Post-education Data


Post test - HTN Patients that Follow the DASH Diet
60
50
40
30
20
10
0
Yes
No
Follow the DASH diet



d. Pre- versus post-education data


Follow and use the DASH diet
70
60
50
40
30
20
10
0
Pre
Post
pre
post
Yes
No


Do you know about the DASH diet?
70
60
50
40
30
20
10
0
Pre
Post
Yes
No