BLOOD PRESSURE AND ITS ASSOCIATED RISK FACTORS AMONG STAFF AT UASIN GISHU LEVEL 5 HOSPITAL, UASIN GISHU COUNTY, KENYA

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H60/33573/2015

A RESEARCH THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE MASTER OF SCIENCE IN FOOD NUTRITION AND DIETETIC IN THE SCHOOL OF PUBLIC HEALTH AND APPLIED HUMAN SCIENCES, KENYATTA UNIVERSITY.

AUGUST, 2020

DECLARATION

"This thesis is my original work and has not been presented for a degree in any other University"

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DEDICATION

I dedicate this thesis to my parents Mr. and Mrs. Sum, my siblings Beatrice, Ruth and Sammy for their support and encouragement throughout this period of study.

ACKNOWLEDGEMENT

First and foremost, I want to thank God for the wisdom, strength and good health during this research period. Sincere gratitude to my supervisors Dr. Ann Munyaka and Dr. Regina Kamuhu of Kenyatta University for their guidance, encouragement and dedicated supervision. I also thank members of the Department of Food Nutrition and Dietetics for their contribution to this research work. Special thanks to Prof Judith Waudo and Ms. Grace Kahiga for the encouragement and consultation.

My appreciation goes to Uasin-Gishu county administration and hospital administration for the prompt permission to carry out this research. Many thanks to the head nutritionist and her colleagues for the support they accorded me during the data collection process. Special thanks to the staffs of Uasin Gishu hospital for finding time to participate in the study. Also importantly I want to appreciate Dr Festus Kiplamai, and Ms. Jackline Kipkorir for their assistance in data analysis in which this work could not have materialized.

I recognize and appreciate my fellow students especially Dorcas for their encouragement throughout these journey. Last but not least my family members for their moral and financial support throughout the study period.

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OPERATIONAL DEFINITION OF TERMS

Alcoholic- refers to drinking more than four standard drinks on a week, where a standard drink is 14 grams of alcohol regardless of container size or alcohol type.

Blood pressure- refers to total peripheral resistance and arterial stiffness and varies depending on situation, emotional state, physical activity levels and relative health or disease state.

High blood pressure- refers to condition in which blood vessels have persistently raised blood pressure and in this study diastolic blood pressure above 85 mmHg according to WHO (2000) classification.

Dietary practices-refers to the habitual decisions on dietary intake, consumption patterns and dietary diversity.

Nutritional status-refers to BMI as categorized by WHO as underweight, normal, overweight and obesity and as well as waist hip ratio.

Occupational stress- refers to work related stress such as downsizing, increased workloads, overtime, shiftwork and hostile environment.

Physical activity- refers to any body movement produced by contraction of skeletal muscle that increases energy expenditure above the resting levels and comprises routine daily tasks such as walking, occupational tasks, household chores as well as purposeful health enhancing activities.

ABBREVIATIONS AND ACRONYMS

AHA	:	American Heart Association
BMI	:	Body mass index
BP	:	Blood pressure
CVD	:	Cardiovascular diseases
DALY	:	Disability adjusted life years
DBP	:	Diastolic blood pressure
DDQ	:	Dietary diversity questionnaire
FAO	:	Food and Agriculture Organization
FFQ	:	Food frequency questionnaire
GPAQ	:	Global physical activity questionnaire
HBP	:	High blood pressure
HDLs	:	High density lipoproteins
KDHS	:	Kenya demographic health survey
LDLs	:	Low density lipoproteins
Mg/dL	:	Milligrams per deciliter
Mm Hg	:	Millimeters of mercury
RDI	:	Recommended dietary intake
SBP	:	Systolic blood pressure
SPSS	:	Statistical package for social sciences
TC	:	Total cholesterol
TG	:	Triglycerides
WHO	:	World Health Organization
WHR	:	Waist hip ratio

ABSTRACT

High blood pressure continues to be a global public health issue and attention needs to be given to primary preventive measures especially among health practitioners who are a channel to the entire population. Modifiable risk factors for hypertension include overweight and obesity, low consumption of fruits/vegetables, physical inactivity, occupational stress, smoking and excess alcohol consumption. The prevalence of hypertension among health workers in other countries outside and within Africa ranges between 10%-33% while Kenya is between 18.4-32.6% among various community populations but there is no specific data on the prevalence of hypertension among health workers in Uasin Gishu County. This study aimed at determining blood pressure and its associated risk factors among staff at Uasin Gishu level 5 Hospital, Uasin-Gishu County. A cross-sectional analytical study was conducted on a convenient sample of 136 respondents at Uasin Gishu hospital since it is the largest hospital in Uasin Gishu County. Pretested and validated tools were used. A structured questionnaire was used to collect data on socio-demographic characteristics and behavioural factors. 24-hour dietary recall and dietary diversity score were used to collect data on dietary practices. Data on physical activity levels of respondents was collected using the Global physical activity questionnaire. Anthropometric parameters namely weight, height and waist hip ratio were used to determine the nutritional status which was described using World Health Organization classification on Body Mass Index (BMI) and waist hip ratio (WHR). 24hr dietary recall data were analyzed using Nutri-survey. Demographic and socio-economic factors, behavioural factors, occupational stress, dietary practices, nutritional status and physical activity level were analyzed using descriptive statistics. Pearson correlation test was used to determine the relationship between variables, chi-square for the association. A p-value of <0.05 was used as a criterion for statistical significance. The mean age of the hospital staff was 36.96±9.96 years. Prevalence of high blood pressure was 22.6% with the most prevalent risk factors being central obesity (66.9%), BMI above 24.9kg/m2 (63.4%), occupational stress (23%) and physical inactivity at 14%. High dietary cholesterol intake of 219mg which is above RDI of 200mg was observed in female respondents. A Majority (80.1%) had medium dietary diversity score. Dietary intake of key micronutrients such as potassium, calcium in women and vitamin C in males were below the recommended dietary intake. Gender was associated with BMI (p-value = 0.007) and physical activity level (p-value = < 0.001). Factors related to BP were BMI (p-value= 0.011), WHR (p-value= 0.002), age (p-value = < 0.001), education (p-value= 0.016) and household size (p-value= 0.004). Socio-demographic and nutritional status of Uasin Gishu hospital staff influenced their BP levels. Based on findings from this study, respondents should be informed on their nutritional status and blood pressure levels and its associated risk factors. County health administration may find the results from this study useful to help come up with interventions to curb risk factors among their staff. Ministry of Health and other relevant stakeholders such as Kenya Cardiac Society, International Society of hypertension and MoH involved in the prevention and management of hypertension may find this information useful for guiding policy and meeting global targets and goals.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

High blood pressure is a condition in which long term force of the blood against blood vessels is high enough to eventually cause health problems such as heart diseases. According to World Health Organization, WHO standards and Joint National Committee on Prevention Detection Evaluation and Treatment of High Blood Pressure, JNC (VII), high blood pressure refers to blood pressure above 140/90 mmHg on repeated diagnosis (WHO 2013). Hypertension is termed as a silent killer because it often has no warning signs or symptoms at the early stage and many people do not know that they have it. It is a key risk factor for cardiovascular diseases (CVDs) (Farag *et al*., 2014).

Globally CVDs accounts for approximately 17 million deaths yearly and about 80% of these deaths occur mainly in low and middle-income countries (Alwan, 2011). High blood pressure (HBP), which affects a billion people worldwide, is the leading cause of heart attacks and stroke. Researchers have estimated that 9 million people die every year due to raised blood pressure (WHO, 2013). Hypertension is responsible for at least 45% of death due to heart disease (Slim, Vos, Flaxman, Danaei & Shibuya, 2012). As per the year 2013, the prevalence of hypertension was highest in the African region with 46% of adults aged 25 and above being hypertensive, while America had the lowest prevalence of 35% among the continents (WHO, 2013). According to Mohamed *et al.,* (2018), his study findings of a national survey reported a prevalence of high blood pressure at 24.5% among adult's population in Kenya.

An effective high blood pressure management program should be diverse and requires the participation of patients, families, communities and health care delivery systems. This includes awareness to patients and health care providers, appropriate lifestyle modifications, access to care, evidence based-treatment, high level of medication adherence and adequate follow-up (Roger *et al.,* 2011). The modifiable risk factors for hypertension include raised cholesterol levels in the body, obesity, less than 5 servings of fruits and vegetables per day, insufficient physical activity, smoking and high alcohol consumption and occupational stress (Banyangiriki & Phillips, 2013).

In regard to non-communicable diseases risk factors, Steps Survey Kenya (2015) reported that 91.8% of adults with raised blood pressure are not on medication, 5% were on medication and not in control while 3% were on medication and their pressure was controlled. Those found in stage 2 and emergency crisis with medication are at 23.8% and those with more than three risk factors for hypertension are at 25.9%, 25.3% and 26.5% in both sexes, in males and females respectively indicating vulnerability to hypertension by both sexes.

1.2 Problem Statement

Hypertension was declared a global public health issue by the World Health organization on the world health day in 2013, (WHO, 2013) and there is a need for attention since the increase is alarming. A recent national survey shows that the prevalence of HBP was 24.5% among adults in Kenya while data from recent studies indicated that prevalence of HBP ranges from 18.4-32.6% among various communities in Kenya (Mohamed *et al.,* 2018). According to Kenya Demographic Health survey

(2014), 9% of women and 3% of men reported that they had been informed by the health provider that they were hypertensive and that 11.6% of the urban population had high blood pressure compared to 7.8% of the rural population. These percentages generally increase with age, education and wealth status. Better control of hypertension and its associated risk factors is expected among hospital staff considering the proximity to health care delivery. A study by Egbi, Rotifa, & Jumbo (2015) reported that crude adjusted prevalence of hypertension is at 21.3% while age-adjusted prevalence is at 23.8% among hospital employees in Nigeria.

Hypertension is the major cause of disease burden in both developed and developing regions with 64 million disability adjusted life years (DALY) which affect individual productivity and effectiveness. It leads to early retirement and reduced health workforce that generally affect the economy of the country (Farag *et al.*, 2014). Even though many health workers may be knowledgeable on the control and early diagnosis of hypertension, compelling demands at job, workload and lack of signs and symptoms of hypertension could be barriers toward achieving the recommended levels of blood pressure (Mitwalli *et al*., 2013).

Hypertension is attributed to risk factors such as; consumption of food containing a lot of salt, sugars and fats with an increase in age, as well as not eating enough fruits and vegetables, harmful levels of alcohol use, physical inactivity, obesity, high social-economic status, gender and occupational stress (Bosu, 2016; Salaudeen et al., 2014; Egbi *et al.*, 2015). A study by Cavagioni & Pierin (2012) among health professional in

Brazil found that among hypertensive victims of behavioural risk factors; 20.1% were smokers, 47% were alcoholic while 64% had a sedentary lifestyle.

Kenya has shown increased rates of mortality due to cardiovascular diseases (KDHS 2014), although measuring blood pressure has become a standard operating procedure in Kenya before any treatment and proximity of health services. Existing research conducted on blood pressure are on a general population in Kenya and other populations but no specific data in Uasin-Gishu county and little is concluded on blood pressure and its associated risk factors especially among the hospital workers in Uasin Gishu County. Therefore, to address this gap, this study was carried out to assess blood pressure and associated risk factors of staff in Uasin Gishu level 5 hospital, Uasin-Gishu County.

1.3 Purpose of the Study

The purpose of this study was to determine blood pressure and its associated risk factors among staff at Uasin Gishu level 5 hospital, Uasin-Gishu County.

1.4 Objectives

The objectives of this study were to:

1. Establish the socio-economic and demographic characteristics of staff at Uasin Gishu level 5 hospital.
2. Determine the dietary practices of Uasin Gishu level 5 hospital staff.
3. Assess the nutritional status (BMI and waist-hip ratio) of Uasin Gishu level 5 hospital staff.

4. Establish the level of physical activity of Uasin Gishu level 5 hospital staff.
5. Assess the occupational stress levels of Uasin Gishu level 5 hospital staff.
6. Establish the blood pressure levels among Uasin Gishu level 5 hospital staff.
7. Determine the relationship among socio-demographic characteristics, nutritional status, dietary practices, physical activity level, and occupational stress with blood pressure levels among Uasin Gishu hospital staff.

1.5 Hypotheses

$Ho_{1:}$ There is no significant relationship between socio-economic and demographic factors and blood pressure levels of Uasin Gishu hospital staff.

$Ho_{2:}$ There is no significant relationship between occupational stress and blood pressure levels of Uasin Gishu hospital staff

Ho_3: There is no significant relationship between dietary practices and blood pressure levels of Uasin Gishu hospital staff.

Ho_4: There is no significant relationship between nutritional status and blood pressure levels of Uasin Gishu hospital staff.

Ho_5: There is no significant relationship between physical activity level and blood pressure levels of Uasin Gishu hospital staff.

1.6 Significance of the Study

This study has provided information on the risk factors associated with high blood pressure to the participants and the Ministry of Health. These findings informed participants on adjustments they needed to make with regards to the risk factors. The

results informed the Ministry of Health and Uasin Gishu level 5 hospital management in particular on interventions necessary to curb the risk factors and help improve the health of their workers. Finally, the study has added literature in the area of hypertension risk factors among health workers and provided information on which further research can be based.

1.7 Delimitation of the Study

Since the study was conducted in one county, generalizing to the other counties and the country as a whole may not give the true picture of the situation. This could be due to differences in dietary practices and geographical area that affect both dietary practices and the level of physical activity.

1.8 Limitation of the Study

The study did not focus on other metabolic indicators such as serum lipid profile, blood sugar levels and inflammatory factors. This study does not reflect seasonal variations.

1.9 Conceptual Frame Work

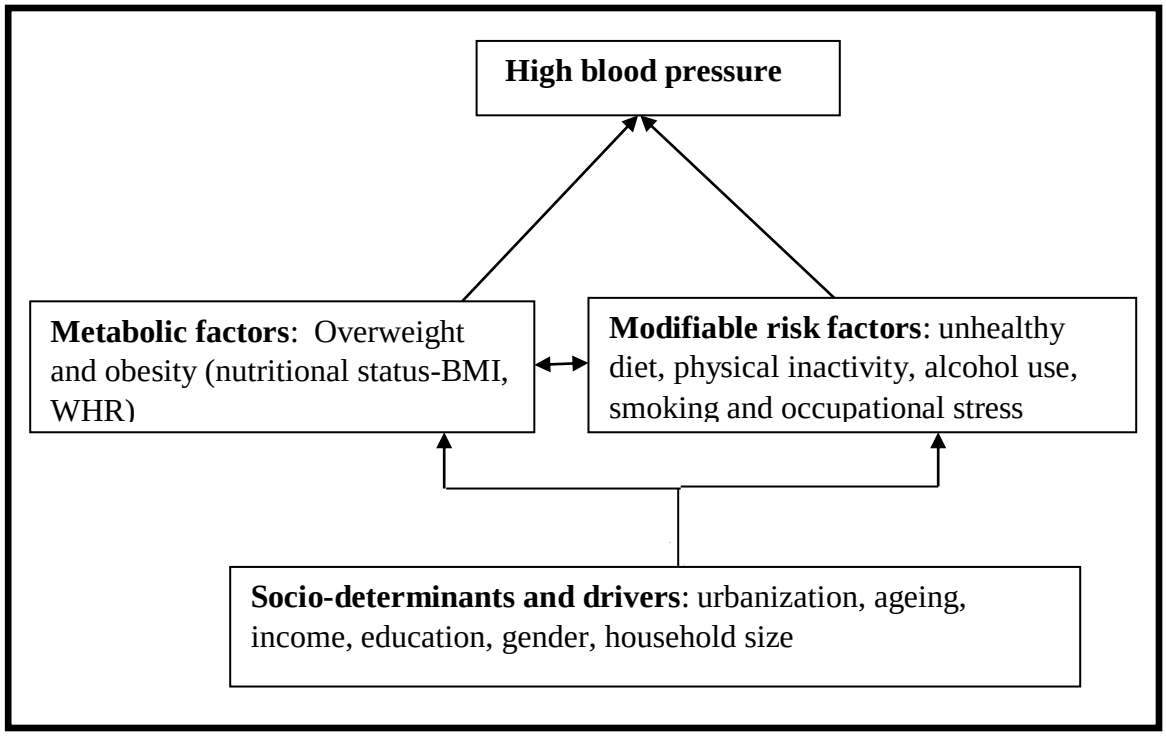

Figure 1.1 Conceptual framework on main factors that contribute to hypertension

Source: Adopted and modified from WHO 2013

Figure 1.1 shows how factors under study influence each other. Urbanization leads to poor lifestyle habits, for example, a sedentary lifestyle that is associated with overweight and obesity resulting in hypertension. Nutrition transition caused by urbanization and high income has led to the use of refined foods and high fatty foods causing an increase in body weight and which result in high blood pressure. Poor fat distribution due to unhealthy diets and physical inactivity especially in the abdominal section affects the heart and blood vessels by increasing their vascular resistance and in turn raises blood pressure. Age comes with less physical activity and low consumption of fruits and vegetables which leads to increase in weight resulting in hypertension.

Behavioural factors like alcohol use and smoking can be caused by occupational stress such as increased workloads, shifts and overtime. These are direct factors to weight gain that reduces physical activity levels resulting in hypertension.

CHAPTER TWO: LITERATURE REVIEW

2.1. Prevalence of High Blood pressure

The global prevalence of high blood pressure in adults aged 25 years and above was 40% in 2008 which is approximately 1 billion people, an increase from 600 million people in 1998 (WHO, 2013; Mills *et al*., 2015). Globally, there are increased hypertension cases from 594 million in 1975 to 1.13 billion in 2015 as per the reviews on current trends (WHO, 2016). The recent report on the prevalence of hypertension varies around the world, with the lowest prevalence being reported in the rural part of India at 3.4% in men and 6.8% in women. The highest prevalence of hypertension is reported in Poland at 68.9% in men and 72.5% in women (Goyal & Sarwate, 2014). In Africa the average prevalence of hypertension was 19.7% in 1990, 27.4% in 2000 and 30.8% in 2010 which translate to over 54.6 million cases of hypertension in 1990, then 92.3 million in 2000, 130.2 million in 2010. The projected hypertension cases in 2030 are 216.8 million cases in Africa (Alwan, 2013). In Kenya, recent studies have indicated that the overall prevalence of hypertension was 29.4% in one of the slums and 24.5% in a national survey among adults in Kenya (Olack *et al*., 2015: Mohamed *et al*., 2018).

According to a study conducted by Sharma, Anand, Kishore, Dey and Ingle (2014), the prevalence of hypertension among health care professionals was 10% in India. In Nigeria Egbi *et al*. (2015) and Owolabi, Owolabi, OlaOlorun, Amole (2015) reported a crude and age-adjusted prevalence of hypertension as 21.3% and 23.8% respectively among hospital employees and 20.1% among health workforce. A study by Cavagioni

& Pierin, (2012), found a prevalence of hypertension to be 33% among health professionals working in pre-hospital care services in Brazil. Little is known about the prevalence and associated risk factors for hypertension among health workers in both developed and developing countries. This study, therefore, seeks to determine blood pressure and associated risk factors among hospital staff in Uasin Gishu District hospital.

2 .2 Factors Associated with High Blood pressure

2.2.1 Socio-Economic Factors and High Blood pressure

According to Abubakar *et al*. (2009), economic and social factors affect blood pressure and the prevalence of high blood pressure is highest in an urban setting. In a study carried out by Miyaki *et al*. (2013), it was found that education level and household income were significantly associated with salt intake, which is known to influence blood pressure. According to a study conducted by Yuan, Chen, Teng, and Fang (2016), illiterate participants showed a low prevalence of hypertension (28.62%) while literate (high school and beyond) counterparts showed higher (35.27%) prevalence. Other similar results were reported in other developing countries such as in Indians, Mexican women, Cuban men and Jamaican men. Compelling results from the above different studies reveal that socio-economic status is an independent determinant of blood pressure. This study will, therefore, assess socio-economic and demographic factors that are associated with high blood pressure.

2.2.2 Occupational Stress and High Blood pressure

Occupational stress across diverse work settings including job insecurity, the nature of job such as long hours of working per week was associated with elevated diastolic blood pressure (Cuffee *et al.,* 2014). According to a study by Ito *et al.,* 2014 among health workers in Japan, nurses and physicians experienced a moderate amount of stress while administrative workers showed less stress. A study carried out among health workers in Nigeria found that the largest numbers of subjects with work stress had high blood pressure and these were associated with a high prevalence of hypertension (Owolabi *et al*., 2012). Generally, the effects of job strain are much more felt in women than men and explain why more women have a high blood pressure than men (Spruill, 2010). According to reviews done by Wilson, Conroy & Dorevitch, (2014), high job strains combined with poor social support were proposed to have a greater risk on health and especially hypertension. Furthermore, this is seen in frequent absence from the job due to health reasons. However, an association between occupational stress and blood pressure levels among health care staff in Kenya is not clear.

2.2.3 Dietary Habits and High Blood pressure

Dietary habits that affect blood pressure include increased sodium intake, decreased potassium intake, a diet high in saturated fats such as high-fat dairy product and low vegetable and fruit intake (Bazzona, Green, Harrison, & Reynolds, 2013). According to the American Diabetes Association (2016), fresh fruits and vegetable consumption is inversely associated with the risk of CVDs. Also, cohort studies indicate, that pooled relative risk for stroke in individuals taking 3-5 servings of fruits and vegetables per day

was 0.89 (95% Cl 0.83-0.97) and 0.74 (95% Cl 0.69-0.79) for those taking more than five servings per day.

According to Willet (2017), the Mediterranean diet is associated with lower levels of cholesterols and systolic blood pressure in overweight and obese people. Mediterranean diet comprises of fresh fruits and vegetables, whole grains, legumes, olive oil, nuts, fish, low sodium diet, garlic and aromatic herbs with the use of traditional cooking methods. Evidence from research has shown that excessive intake of sodium is a risk factor for hypertension and intake above 2 grams per day was implicated in 1.65 million cases of cardiovascular deaths worldwide in the year 2010 (Smith, Juusola, Enns, Owens & Garber, 2010). Research shows that an increase in sodium intake leads to the increased intravascular fluid volume which results in increased cardiac output that leads to increased peripheral resistance which consequently results in high blood pressure. This elevated blood pressure then increases renal perfusion pressure that triggers increased excretion of sodium with water (Sacks & Campos, 2010).

Dietary modification involving reduction of sodium intake, low saturated fat intake and weight reduction is important for blood pressure control in black Americans and other minority populations (Stuart-shor, Berra, Kamau & Kimanyika, 2012). According to Bazzona *et al*. (2013) reviews indicated that a DASH-like dietary pattern in addition to substituting protein for carbohydrates and fats (monounsaturated) lowered blood pressure. Reviews from studies in western countries show an association of particular food intake with the elevated blood pressure but there are limited studies in Kenya on dietary intake and blood pressure levels. This study aims to establish an association

between dietary practices and blood pressure levels among Uasin Gishu County hospital staff.

2.2.4 Alcohol use, Smoking and High Blood pressure

Hypertension and high risk of atrial fibrillation have been associated with increased alcohol consumption (Larsson, Drca & Wolk, 2014; Husain, Ansari, & Ferder, 2014). According to Hee-Ju, Ik-Rae, Hyo-Joo & Tae-Young (2016), alcohol consumption in women was seen to increase body weight, body fats, BMI and total energy intake, resulting to increase in systolic blood pressure. Evidence from studies suggests a positive relationship between alcohol consumption and hypertension with various implications in treatment, management and prevention of high blood pressure on high-risk groups (Charantimath, 2012). Among hypertensive patients working as a health professional in Brazil, 20.1% were smokers while 47% were alcoholic (Cavagioni & Pierin, 2012). In a study by Olack *et al*. (2015) in Nairobi slum, it was found that those who were current smokers had high blood pressure. According to non-communicable disease risk factors Steps Survey in Kenya (2015), the percentage of those who currently smoked tobacco was reported to be 10.1% in both sexes. The percentage of those who were currently drinking alcohol was reported as 19.3% in both genders with 33.8% of males and 5.4% of females, this is a clear indication that behavioural factors such as smoking and alcohol consumption influence blood pressure. Therefore, this study sought to assess the influence of smoking and alcohol use on blood pressure among Uasin Gishu Hospital staff.

2.2.5 Physical Activity and High Blood pressure

According to Bento *et al.*, (2015), there is a significant reduction in the systolic and diastolic pressure upon exercise. Furthermore, a study among Malaysian adults showed a positive association between physical activity and systolic blood pressure while no significant relationship between diastolic blood pressure and physical activity was found. Low and moderate physical activity was associated with high blood pressure (Chien, Ying & Lee 2015). According to Saxena, Gupta, Moinuddin & Narwal (2016), there was a reduction of diastolic blood pressure in the resting period after physical activity in the intervention group. Besides, it has been shown that there is a relationship between a sedentary life and the incidence of high blood pressure among Spanish adults (Diaz & Shimbo, 2013). According to Olack *et al*., (2015), low physical activity was associated with hypertension in one of the slums in Kenya. Compelling evidence from research carried out by Kannan *et al.* (2014), Delavar (2011) and Dancy, Lohsoonthorn & Williams (2008) in Thai professional and office workers indicates that there was a relationship between high physical activity and increased levels of HDL with reduced levels of triglycerides and LDL on both males and females though no correlation between physical activity and total cholesterol was found. This study aims to assess if there is an association between physical activity and blood pressure levels among Uasin Gishu level 5 hospital staff in Kenya.

2.2.6 Nutritional Status and High Blood pressure

A study conducted in Bangladesh on hypertension among adults showed that high BMI was associated with high blood pressure (Chowdhury, Uddin, Haque, & Ibrahimou,

2016). According to a research conducted in Northeast India, maximum systolic and diastolic pressure was observed in obese individuals while minimum diastolic and systolic pressure was observed in underweight individual (Mungreiphy, Kapoor, & Sinha, 2011). Results from research conducted among Kenyatta university employees reported that there was a strong positive relationship between obesity and hypertension (Mogesi, 2011). Also, a report from a study involving Kenya Defense Forces indicated that those with hypertension were more overweight and obese as compared to those with normal blood pressure (Mundan, Muiva, & Kimani, 2013).

According to Hulzebosch, van de Vijver, Oti, Egondi, and Kyobutungi (2015), the higher percentage of women in one of the slums in Kenya were overweight and obese while men showed high rates of abdominal obesity by waist circumference. Moreover, men had higher systolic blood pressure than female. Besides, data from research in India showed that high percentages of overweight males and females were found to be prehypertensive and the levels of high blood pressure were high among males than females (Sharma *et al.*, 2014). Furthermore, a study carried out in Nigeria among health service providers indicated that most of the respondents were overweight and obese. Those who were obese had high systolic and diastolic pressure accompanied by low physical activity (Iwuala *et al.*, 2015). There is a significant relationship between nutritional status and blood pressure levels from the above studies, therefore the need for this study.

2.3 Summary of Literature Review

The prevalence of hypertension is quite high at 40% globally (Alwan, 2011). Kenya is among those countries affected by hypertension with 24.5% in the general population (Muhamed *et al.,* 2018) while 11.6% of the urban population being reported to have high blood pressure as opposed to 7.8% of the rural population (KDHS, 2014). More research is needed to understand why there is a high occurrence of hypertension in the population and especially health workers who are considered to be the leading team in motivation and control of blood pressure. Occupational stress is one of the factors believed to cause hypertension, but convincing evidence for such an association is difficult to find among hospital practitioners especially in Kenya. Excess alcohol use and smoking are associated with hypertension, though the link between these is not clear. Several risk factors for hypertension have been identified including age, gender, lifestyle among others in western countries. However, the effect of dietary habits, physical activity, nutritional status and how they affect blood pressure has not been ascertained among hospital staff in Kenya.

DASH studies indicate that there are different mechanisms of reducing and stopping hypertension although many studies are not clear on how these factors can influence hypertension. This study is aimed at ascertaining blood pressure and associated risk factors among Uasin Gishu level 5 hospital staff.

CHAPTER THREE: METHODOLOGY

3.1 Research Design

Cross-sectional analytical study design was carried out among Uasin Gishu Level 5 hospital staff. This design was selected since it is a one-stop study combining both qualitative and quantitative methods of research at one point in time.

3.2 Research Variables

3.2.1 Dependent Variable

The main dependent variable in the study was blood pressure levels.

3.2.2 Independent Variables

Socio-economic and demographic factors, alcohol consumption and smoking, dietary practices, nutritional status (BMI and WHR), physical activity level, occupational stress, were the independent variables in this study.

3.3 Study Area

The study was carried out at Uasin Gishu Level 5 hospital in Uasin-Gishu County within Eldoret town. This study location was selected since it is the largest referral Level 5 hospital with workers coming from all over the county. Uasin-Gishu County is one of the 47 counties in the republic of Kenya located in the former Rift valley province. According to the 2009 Kenyan population and housing census, the population of the county stands at 894,179 people representing 50% males and 50% females and covers 1,141m^2. Eldoret town is situated 330km northwest of Nairobi. Uasin Gishu county hospital had 169 workers who came from all over the county living within

Eldoret town and surrounding areas. This hospital serves the entire county as a referral hospital and is under the supervision of a medical superintendent who is in charge of the hospital affairs and staff. Health care providers in Eldoret town are among the largest number of the civil workers in the area and who earn their income from the County government revenue and also contribute to the economy of the County through the payment of taxes.

3.4 Target Population

The study population consisted of both males and females' workers in Uasin Gishu Level 5 hospital. This target group was selected since there are limited studies conducted among health care staff on blood pressure levels and their associated risk factors yet they are vulnerable according to the non-communicable disease risk factors (Steps Survey Kenya, 2015) that indicated 25.9% of adults had more than three risk factors.

3.4.1 Inclusion Criteria

The study included all hospital staff that consented to participate in the study and those who were present at the time of the study.

3.4.2 Exclusion Criteria

Pregnant, lactating female staff and hospitalized staff were excluded from the study since their physical activity level and physiological status would not depict a normal daily routine.

3.5 Sample Size Determination

According to Uasin Gishu hospital staff records annual report, the total number of the hospital staff was 169. The sample size determination was calculated using Yamane (1967) formula:

$n = N/1+N\ (e)^2$

n = sample size for hospital staff

N = Population size for hospital staff in Uasin Gishu County hospital

e = Level of precision to be used.

Therefore: $n= 169/1+169(0.05)^2$

$n = 118.8 = 119.$

Then ten percent of 119 was added to cater for non-response making the sample size 138 hospital staff; however, data were collected on 136 staff who consented and participated in the study.

3.6 Sampling Procedures

Uasin Gishu County was purposively selected and Uasin-Gishu Level 5 hospital was purposively selected since it is a referral hospital and has workers from all over the county. Convenience sampling was used to select the hospital staff.

3.7 Research Instruments

A structured questionnaire adapted and modified from the WHO stepwise instrument

(Appendix B) was used as the main tool to collect data. Section 1 collected data on Socio-demographic and economic characteristics. Section 2 was used to collect data on modifiable risk factors which include tobacco use (2.1.1), alcohol consumption (2.1.2) and occupational stress (2.1.3). Dietary practices data was collected using the questionnaire shown in section 2.2 which was further divided into three sections including 24hr dietary recall (section 2.2.1), food frequency questionnaire (section 2.2.3) and individual dietary diversity questionnaire (section 2.2.4). The global physical activity questionnaire (Section 2.3) was used to assess physical activity level. Blood pressure and anthropometric measurements were measured and recorded in appendix C.

3.8.1 Validity

Standard validated instruments to collect data such as FAO/WHO approved dietary practices; dietary diversity questionnaire (DDQ), 24hr dietary recalls and FFQ were used. WHO Global Physical Activity Questionnaire (GPAQ) was used to assess the level of physical activity. Supervisors at Kenyatta university department of Food, Nutrition and Dietetics provided technical advice on the questionnaire. Blood pressure machine and nutritional status instruments such as digital scale were standardized using calibration method and measurements were done twice. Blood pressure data were measured by a qualified nurse.

3.8.2 Reliability

The test-retest method was used to assess the reliability of the tool. The 14 hospital staff used in the pre-test were interviewed the second time after three days and a reliability coefficient of at least 0.70 was considered acceptable. Using the Cronbach correlation

formula, reliability co-efficient of 0.83 was found and thus the research instrument was accepted (Vereecken et al., 2009).

3.9 Data collection Procedures and Techniques

3.9.1 Recruitment and Training of Research Assistants

Two research assistants comprising one nutritionist and a nurse, with a minimum qualification of a diploma in their respective fields were recruited. The training for the nutritionist included administration of questionnaires, taking of dietary data that is 24hr recall, a 7-day food frequency, dietary diversity and nutritional status to ensure accuracy of data whereas nurse was instructed how to take and record blood pressure levels.

3.9.2 Data Collection Procedures

The researcher administered questionnaire was used to conduct face to face interviews among Uasin Gishu Level 5 hospital staff (appendix B).

3.9.3 Pretesting of the Tools

The questionnaire was pretested on 14 hospital staff at the nearby Moi Teaching and Referral hospital, which constitutes the recommended 10% of the study sample. Feedback from this pretest was used to come up with a logical flow of questions and eliminate questions that were not giving any meaningful information. This was done to ensure the clarity of the structured questionnaire and help make necessary adjustments.

3.9.4 Dietary Assessment

Dietary practices were assessed using a 24hr dietary recall to estimate the amount of food and nutrients consumed using household measures that were later converted to

grams or litres. In administering of 24-hour recall, respondents were asked the foods they consumed on the previous day from morning to evening. Food models and calibrated types of equipment were used to estimate the amounts of food taken. This was done with a lot of probing to ensure that all the required data was collected. Hospital staff were then requested to indicate the exact time the meals and snacks were consumed. Data from 24hr recall was analyzed using Nutri-survey software. Seven-day FFQ consisting of nine food group was used to assess how frequently a food item was consumed by an individual within one week while dietary diversity gave the number of food groups in the DDQ taken by an individual within 24hours. This was done by face to face interview where an interviewer read the food item in the list and the individual responded by yes or no as the interviewer ticked on the tool.

3.9.5 Anthropometric Assessment

Weight was measured using a Digital Seca® 813 scale to the nearest 0.1kg with the least cloth and barefooted. Height was taken using a Seca® 213 stadiometer (resolution of 1mm) with the participant standing erect and their back and buttocks touching the wall and their feet on flat ground. Body mass index was calculated as weight in kilogram divided by the square of height in meter (kg/m^2) and classified as per the WHO classification of Obese (BMI>30), Overweight (BMI 25-29.5), normal BMI (18.5-24.9) and underweight (BMI<18.5). Waist hip ratio was determined by measuring waist circumference and hip circumference using a 203 cm Seca® measuring tape. Waist circumference was measured at the midpoint between the iliac crest and lower border of the tenth rib. Hip circumference was measured around the widest portion of

the buttocks with the tape parallel to the floor. Participants were standing with feet close together, arms at the side with body weight evenly distributed and with few clothes for both measurements. Measurement was done twice and average taken to the nearest 0.1cm as recommended by WHO and the waist-hip ratio was calculated by dividing waist circumference by hip circumference measurements (appendix C).

3.9.6 Physical Activity Assessment

The GPAQ questionnaire was used to collect data on the physical activity of the hospital staff. This questionnaire was found appropriate since it captures physical activity engagement in different settings such as at work, of recreational activities and travel to and from places. Face to face interviews was conducted by a trained interviewer. All questions were read to the participant and those that were answered negatively skipped. Use of show cards was used for more clarity. Physical activity levels were described by the use of metabolic equivalent (METs). METs are the amount of Oxygen an individual consumes when sitting at rest (WHO, 2017). Physical activity was classified as adequate above 600METs and inadequate below 600METs.

3.9.7 Occupational Stress Assessment

A questionnaire in appendix B with nine questions was used to assess occupational stress by face to face interviews with the hospital staff. The response ranged from no stress as 1 to extremely high stress as 5. A composite variable was created on the scores and these were used for analysis.

3.9.8 Blood pressure Assessment

Blood pressure was measured using OMRON digital fully automated blood pressure monitor. The blood pressure of the participants was taken in the morning hours to cater for uniformity and this was done by a qualified nurse after 10 minutes sitting rest by the hospital staff. Measurements were taken within one-minute interval on the left arm and the arm supported at the level of the heart and feet flat on the floor. The measurement was done three times and the average was taken (Appendix C).

3.10 Data Analysis

Data from the questionnaires was cleaned, coded, entered and analyzed using the Statistical Package for Social Sciences software (SPSS). Descriptive statistics were used to describe variables while Pearson correlation and chi-square was used for relationship and association between variables as shown in table 3.1. Data was assessed at 0.05 level of significance.

Table 3. 1: Data Analysis on the Nature of the Variable and the Statistical Test

Objective	Tool	Nature of Variable	Statistical Test
Socio-economic & demographic characteristics	Semi-structured questionnaire	Categorical	Descriptive statistics-percentages means and SD
Occupational Stress	Semi-structured	Categorical	Descriptive statistics-percentages means and SD
Dietary practices	24hr recall, FFQ, DDQ	Continuous	Descriptive statistics-percentages means and SD
Nutritional status	BMI & WHR	Continuous	Descriptive statistics-percentages means, SD
Physical activity	GPAQ	Continuous	Descriptive statistics-percentages means and SD
Blood pressure	WHO classification	Continuous	Descriptive statistics-percentages means and SD
Relationship and association between variables	SPSS	Continuous categorical	Pearson correlation coefficient and Chi-square

Data from 24hr recall was analyzed using Nutri-survey software and compared to the recommended dietary intake. Dietary diversity score of 14 food groups was categorized as low dietary diversity when an individual consumed 4 food groups and below, medium when 5-9 food groups were consumed and high when an individual consumed 10-14 food groups (FAO, 2011). Physical activity was categorized using minutes of physical activity per week using the GPAQ analysis guide with minutes above 600MET per week indicating adequate physical activity while minutes below 600 MET per week indicated inadequate physical activity. Occupational stress was analyzed using

descriptive statistics. Nutritional status cut-off points were BMI and WHR of 24.9 kg/m^2 and 0.90 for males and 24.9kg/m^2 and 0.85 for females. With regards to BMI, hospital staff with BMI of < 18.5 kg/m^2 were considered underweight, 18.5-24.5 kg/m^2 as normal, 24.6-29.9 kg/m^2 as overweight and >30 kg/m^2 as obese. Waist hip ratio was classified as follows, WHR below 0.85 in female and below 0.90 in males were considered as healthy while those above these figures were considered at risk for disease. Blood pressure was classified using the WHO (2000) classification where diastolic blood pressure <85mmHg was considered as normal, 85-90mmHg considered as higher normal and 90mmHg and above as hypertensive.

3.11 Logistical and Ethical Considerations

Clearance to carry out the research was sought from Kenyatta university graduate school (Appendix D) while ethical clearance to conduct the research was sought from Kenyatta University Ethical Review Committee (Appendix E). A research permit was obtained from the National Council of Science, Technology and Innovations (NACOSTI) (Appendix F). Written permission was sought from county health administrator Uasin Gishu County and medical superintendent of Uasin Gishu Level 5 hospital before commencing the research work. Participants were informed about the study and both verbal and written informed consent was obtained before data was collected (Appendix A). Hospital staff were assured that their information would be treated with respect, the utmost care and high confidentiality. There were no names used during data collection and also other personal information was not shared with any other persons both in verbal or written. All information collected during the survey was

treated confidentially and used only for the study. Participants that were found with high blood pressure were sent to the clinician and those found to be overweight and obese were given oral information on health implication of BMI above 25 kg/m^2 and appropriate lifestyle modification to reduce their weight. They were further referred to the dieticians for more assistance on weight reduction.

CHAPTER FOUR: RESULTS

4.1 Demographic and Socioeconomic Characteristics of the Population

Out of the 138 hospital staff recruited, 136 participated while two individuals were none respondents amounting to 1.5% attrition rate. Among the 136 hospital staff that participated in the study, 51 were males and 85 were females' aged 21-58 years with a mean of 36.96±9.96 years. The age group with the majority of the hospital staff were between ages 31-40 (Table 4.1).

Table 4.1 Age Characteristics of Hospital staff in Uasin Gishu Level 5 Hospital

Age in years	Male n=51 (%)	Female n=85 (%)	Totals n=136 (%)
26-33	13(25.5)	22(25.9)	35(25.7)
34-41	16(31.4)	19(22.4)	35(25.7)
50-57	6(11.8)	11(12.9)	17(12.5)
58 and above	0(0.00)	1(1.2)	1(0.7)

4.1.1 Cadre Information among Uasin Gishu Hospital staff

Nurses (28.5%) and clinical officers (22.7%) categories had the largest number of participants among the different cadres (Figure 4.1).

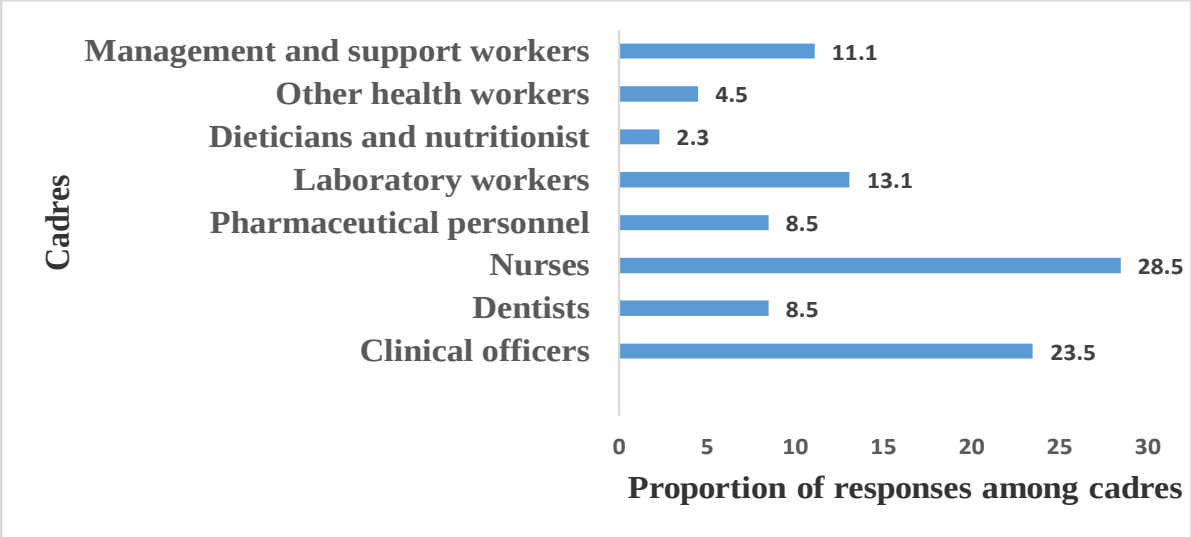

Figure 4.1: Classification of Hospital staff in Uasin Gishu Level 5 Hospital by Cadre

4.1.2 Marital status of Uasin Gishu Hospital staff

More than two thirds (69.9%) of the hospital staff were those married followed by 19.9% of those who were single and 0.7% of those separated at the time of the study. The mean household size was 3.95±1.88 with the highest number of members being six members and the least being one member in a household. Figure 4.2 shows the marital status of the hospital staff.

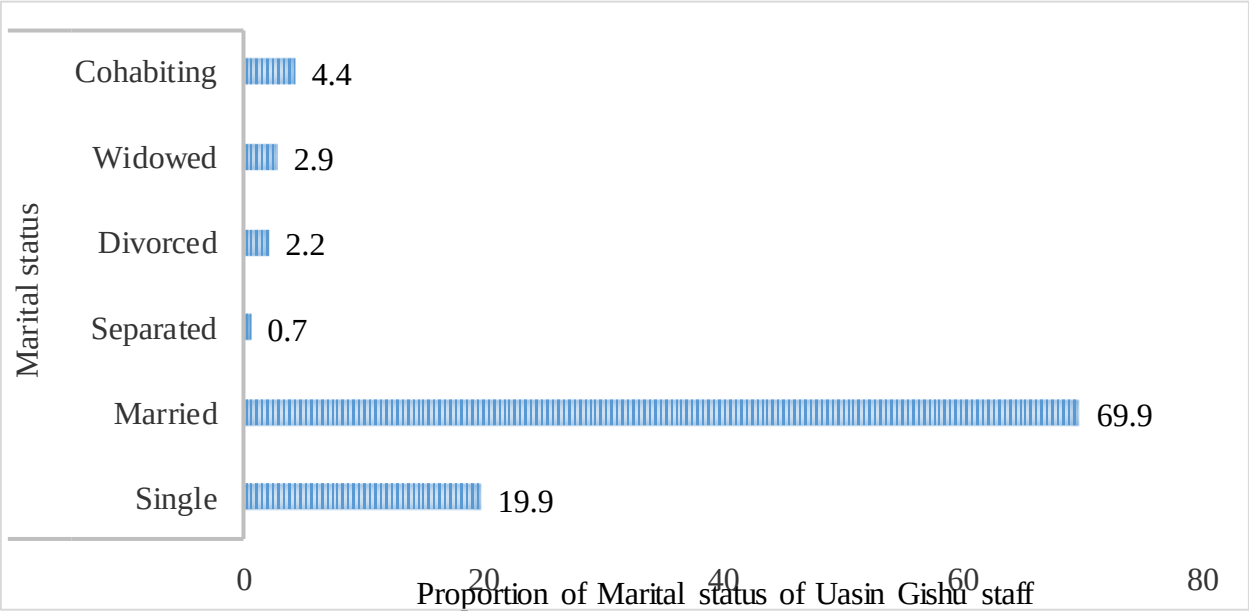

Figure 4.2: Marital status of Hospital staff in Uasin Gishu Level 5 Hospital

4.1.3 Education and Income characteristics of Uasin Gishu Hospital staff

Concerning education level, 95.4% had completed university or college while 4.4% had completed high school. Their main source of income was salary (79.4%) whereas others reported that farming and business were their major income source. Monthly income varied among hospital staff with the majority earning between 30001 and 50000(29.5%), followed closely by those earning less than 30000(27.9%) (Table 4.2).

Table 4.2 Education and Income characteristics of Uasin Gishu Hospital staff

Variable	Category	Frequency (N)	Proportion (%)
Education	Secondary	6	4.4
	College /University	130	88.2
Income	>30000	38	27.9
	30001-50000	40	29.4
	50001-70000	24	17.6
	70001-90000	22	16.2
	90001-110000	8	5.9
	<110001	4	2.9

4.2 Smoking and Alcohol use by Uasin Gishu Hospital staff

In this study, only a few hospital staff (2.2%) were classified as current smokers with majority (97.8%) as non-smokers and did not have any history of smoking. About a quarter (25.7%) of the hospital had consumed alcohol in the past 12 months, of which 82.4% had consumed alcohol in the past 30 days before the study. Of those found to consume alcohol majority of them, 62.9% were males and about 35.3% of the hospital staff were consuming alcohol 1-3 days per month while 8.8% were taking alcohol daily (Table 4.3). About half of the hospital staff (50%) reported having been taking alcohol with meals regularly.

Table 4.3 Smoking and Alcohol use by Hospital staff in Uasin Gishu Hospital

Variable	Frequency (N)	Proportion (%)
Currently smoking	3	2.2
Alcohol use	35	25.7
Male	22	62.9
Female	13	37.2
Alcohol Consumption in 30 days	30	82.4
Daily	3	8.8
5-6 days per week	3	8.8
1-4 days per week	7	20.6
1-3 days per week	12	35.3
Less than once a month	9	26.5

4.3 Occupational Stress among Uasin Gishu Hospital staff

Twenty-three per cent of the participants reported that they were experiencing work-related stress arising from at least two or more of the stressors. More than half of hospital staff reported that they were not experiencing any form of stress at the time of the interview from most of the stressors except in three variables namely much work at a given time, fear of not completing work in time and fear of not meeting employer expectation with the proportion of hospital staff at 31.1%, 35.6%, and 34.8% respectively while showing high percentages in a moderate amount of stress as follows 23.5%, 20.5%, and 25.8% respectively. Among other stressors, promotion, salary increments and transfers were the ones commonly mentioned (Table 4.4).

Table 4.4 Proportion of Occupational Stress Faced among Uasin Gishu Hospital staff

Stress level	No	Slight	Moderate	A lot	Extreme
Percentage of stressors experienced by health workers					
Colleague at work	50.8	31.1	12.1	3.0	3.0
Stress from Boss	54.1	24.7	10.6	4.5	6.1
Much work in a given time	31.1	22.0	23.5	14.4	9.0
Worry about failing	49.2	26.5	9.9	4.5	9.9
Fear not completing work	35.6	28.8	20.5	6.8	8.3
Fear of being ridiculed	56.8	18.2	14.4	6.1	4.5
Fear on employer expectation	34.8	26.5	25.8	5.3	7.6
Fear of shift work	51.5	21.2	9.1	13.6	4.6
Others	55.3	9.1	16.7	9.1	9.8

4.4 Dietary Practices of Uasin Gishu Hospital staff

4.4.1 Dietary Intake Based on 24hr Recall

The mean daily energy intake by hospital staff in both genders was 2368±785.96 while the average daily energy intake among the males and female hospital staff was 2318±406.2 and 2399±324.2 kilocalories respectively. Contribution of carbohydrates to caloric intake was slightly higher than RDI of 60% in both genders with the males getting 69% and females obtaining 68% of calories from carbohydrates respectively. The daily intake of cholesterol (219mg) was slightly higher than the recommended <200mg in females compared to male participants who consumed 157mg. The RDI for sodium and potassium was not met by both genders, with a sodium intake of 1307mg in female hospital staff and 1153mg in male hospital staff being far below the recommended amount of 2300mg. The intake of calcium (735mg) by female hospital staff were below the recommended value of 800mg. Male participants consumed slightly low amounts of vitamin C (59.7mg) which is below the RDI a value of 75mg compared to female participants who consumed 80mg which is above the RDI value of 60mg. Both genders did not meet the recommended dietary intake (25-30g) for dietary fibre with 16g intake among male being lower than the female participants who consumed 18g but with no significant difference between the two groups (Table 4.5). The low intake of dietary fibre could be due to insufficient intake of fruits and vegetables and a high intake of processed foods.

Table 4.5 Dietary Intake of Uasin Gishu Level 5 Hospital staff as per 24hr recall

Nutrient	**Male**	**RDI**	**Met** RDI (%)	**Not Met** RDI (%)	**Female Mean**	**RDI**	**Met RDI (%)**	**Not** Met RDI (%)
CHO (kcal)	2318±406	2300	98	4	2399±324	2000	100	0
Fats(g)	57.08±28	45-60	67	25	58.9±31	45-60	99	2
Proteins(g)	86.3±37	56	93	8	84.0±32	46	94	12
Energy intake kcal	2317±794	2300	89	16	2399±784	2000	100	0
Dietary fibre (g)	16±8	25	12	75	18±6.9	30	18	87
Cholesterol (mg)	157.0±219	<200	34	60	219.1±292	<200	63	3
PUFA (g)	5.02±349				6.05±761			
Na (mg)	1154±846	2300	23	68	1308±1165	2300	39	48
K (mg)	1731±423	2000	35	65	1787±899	2000	48	60
Ca (mg)	848±493	800	78	14	735.1±355	800	77	39
Vitamin C (mg)	59.7±32.2	75	62	28	80.2 ±45	60	94	8

4.4.2 Individual Dietary Diversity Score (IDDS).

Individual dietary diversity score was used to determine the number of food groups that hospital staff consumed. It was classified based on fourteen food groups as recommended by FAO (2011). According to table 4.6 cereals was the most consumed food group which was consumed by 97% of the hospital staff, followed by oils and fats, milk and milk products, and coffee and tea at 89.4%, 87.9% and 85.6% respectively. High consumption of these food groups indicated their availability and affordability. The food groups that were least consumed included fish which was consumed by 14.4% of the hospital staff and organ meat which was consumed by 16.7% of the hospital staff. According to the economic status of the hospital staff, most of them were earning below 50000 and this could be the reason for low intake of foods such as fish. Majority of the people (70.5%) ate their meals or snacks outside home.

Table 4.6: Consumption of a variety of food groups by Uasin Gishu Level 5 Hospital staff

Food groups (%)	Frequency	Proportion
Cereals	128	97
Vitamin A-rich vegetables and tubers	66	50
White tubers and roots	36	27.3
Dark green leafy vegetables	97	73.5
Other vegetables	72	54.5
Vitamin A-rich fruits	64	48.5
Other fruits	29	22
Organ meat	22	16.7
Flesh meats	69	52.3
Eggs	31	23.5
Fish	19	14.4
Legumes nuts and seeds	87	65.9
Milk and milk products	116	87.9
Oils and fats	118	89.4
Sweets	101	76.5
Coffee/tea	113	85.6
Meals or snacks outside home	93	70.5

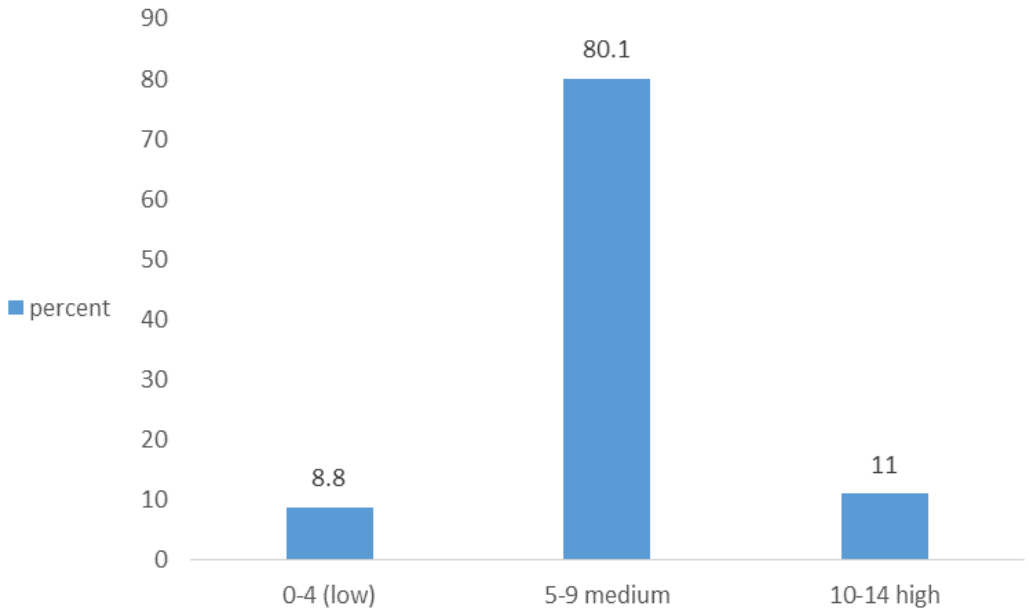

Figure 4.3 Dietary Diversity Score of Uasin Gishu Level 5 Hospital staff

A majority (80.1%) of the hospital staff had medium dietary diversity score (5-9 food groups) while 8.8% had low dietary diversity score (0-4 food group) shown in figure 4.3. Only 11% showed a high dietary diversity of more than ten food groups and these could be those with high income since DDS was found to have a positive relationship with income. Purchase of food has always been related to how much money one earns and also how much is allocated for food.

4.4.3 Hospital staff Dietary Intake of Selected Foods based on 7-day Food Frequency

A seven-day dietary pattern of selected foods in particular food groups was used to assess the dietary practices of hospital staff. Food types containing nutrients of relevance both positive and negative to blood pressure were picked from each food group. The study findings indicate that some of the foods that contain essential

micronutrients were least consumed among participants. Starches rich in potassium such as sweet potatoes were consumed 2-3 days in a week by 28.4%.

Table 4.7 Seven-day Food Frequency of selected Foods by Uasin Gishu Level 5 Hospital staff

Food type	0		Daily		2-3days		4-6 days	
	N	%	N	%	N	%	N	%
Sweet potatoes	71	52.2	5	3.7	38	28.4	24	17.7
Potatoes	46	33.6	8	6.0	69	50.7	13	9.7
Green bananas	64	47.8	4	3.0	50	36.6	17	12.7
Lentils	82	60.4	4	3.0	32	23.1	18	13.4
Beans	19	14.2	14	10.4	79	58.2	23	17.2
Peas	35	26.1	10	7.5	67	49.3	23	17.2
Groundnuts	72	53.0	3	2.2	42	30.6	19	14.2
Sesame seeds	114	83.6	1	0.7	15	11.2	6	4.5
Eggs	42	30.6	8	6.0	54	39.6	33	23.9
Fish	61	44.8	6	4.5	46	33.6	23	17.2
Beef	33	23.9	13	9.7	59	43.3	32	23.1
Oranges	30	21.8	22	15.8	65	48.1	19	14.3
Avocado	29	21.1	23	17.3	61	45.1	22	16.5
Banana	12	9.0	32	23.3	73	53.4	19	14.3
Water melon	62	45.9	6	4.5	44	32.3	23	17.3
Traditional Veg	18	13.5	30	21.1	67	49.6	22	15.8
Garlic	48	35.3	38	28.6	33	24.1	16	12.0
Whole milk	17	12.7	78	57.5	35	26.1	5	3.7
Cooking fats	93	68.4	21	15.0	12	9.0	10	7.5
Cooking oils	18	13.5	82	60.9	29	21.1	6	4.5
Margarine	85	62.7	10	7.5	33	23.9	8	6.0
Mandazi	70	51.5	15	11.2	33	23.9	18	13.4
Sugar	18	13.5	95	69.9	16	12.0	6	4.5
Cakes	77	56.4	7	5.3	33	24.1	19	14.3
Sweets	92	67.7	12	9.0	22	16.5	9	6.8
Biscuit	88	64.7	7	5.3	22	16.5	18	13.5
Sodas	95	66.9	6	4.5	22	16.5	16	12.0

Nuts, seeds and legumes are important since they contain unsaturated fats which are healthy to the heart and helps in blood pressure control. Groundnuts were consumed by 30.6% of the hospital staff, lentils by 23.1% for 2-3 days a week while peas and beans

were widely consumed by the hospital staff. About a third (33.6%) of the hospital staff consumed fish for 2-3 days a week. Bananas, Oranges, Avocado and watermelon that are rich in vitamin C were fruits commonly consumed in 2-3days a week (Table 4.7). Traditional vegetables were consumed by about half (49.6%) of the hospital staff for 2-3 days a week while 21.1% of the hospital staff consumed them daily. It was observed that 28.6% of the hospital staff consumed garlic daily and this contain elements that can prevent clotting of blood hence prevent HBP. About 57.5% of the current study participants used whole milk daily. A majority (60.9%) used cooking oils while sugars were used by 69.9% of the hospital staff. Snacks commonly taken were mandazi and cakes by 23.9% and 24.1% of the hospital staff respectively taken for 2-3 days a week.

4.5 Nutritional Status of Uasin Gishu Hospital staff by BMI and WHR

The nutritional status of subjects was determined by use of WHO (2004) BMI cutoff points. The mean BMI of the hospital staff was 27.18±5.04. Results indicated that 1.6% of the hospital staff were underweight, 35% had normal BMI and 35% were overweight, 20.3% were obese while 8.1% had morbid obesity. Chi-square test revealed that gender was associated with BMI (p-value 0.007) among hospital staff. Females were significantly more likely to become overweight and obese than males with an odds ratio [OR] of 2.8 (95% confidence interval [Cl] = 1.3-6.0, P = 0.008). Based on the WHR measurements majority (66.9%) of the hospital staff were found to have central obesity (Table 4.8). The mean waist-hip ratio was 0.8967, 0.8811in female and 0.9213 in male hospital staff indicating central obesity.

Table 4.8 Nutritional status of Uasin Gishu Level 5 Hospital Staff based on BMI and WHR

Category	BMI					WHR	
	Underweight	Normal	Overweight	Obese	Morbid obese	Normal	Central obesity
Female N	0.0	23.0	29.0	23.0	10.0	29	56
(%)	0.0	27.0	33.8	27.0	12.2	34.2	65.8
Males N	2.0	24.0	19.0	5.0	1.0	16.0	35.0
(%)	4.1	46.9	36.7	10.2	2.0	31.2	68.8
Totals N	2.0	48.0	48.0	27.6	11.0	45.0	91.0
(%)	1.6	35	35	20.3	8.1	33.1	66.9

4.6 Physical Activity Levels of Uasin Gishu Hospital staff

In the current study, only a small proportion of hospital staff (14%) showed inadequate levels of physical activity that is, less than 600 metabolic equivalents (METs) in a week while the majority (86%) showed an adequate amount of physical activity above 600 METs in a week. Female hospital staff (22.5%) were physically inactive compared to the males who were all found to be physically active and meeting the recommended levels per week (Table 4.9).

Table 4.9 Physical Activity Levels of Uasin Gishu Hospital staff categorized by MET

Category	Met Equivalent			
	Inadequate (<600MET)		Adequate (>600MET)	
	Frequency	Proportion	Frequency	Proportion
Male	0.0	0.0	51	100.0
Female	19	22.5	66	77.5
Total	19	14	117	86.0

4.7 Blood Pressure Levels of Uasin Gishu Level 5 Hospital staff

In the current study mean systolic and diastolic BP was found to be 118.98±14.02mmHg and 77.82±10.35mmHg respectively. The mean SBP of 122mmHg

in male hospital staff was high compared to the mean of 117mmHg in female hospital staff while mean DBP was 77mmHg in male participants a figure lower than 79mmHg in female participants. The current study findings indicate that 80.6% of the hospital staff had SBP below 130mmHg and 77.4% had DBP below 85mmHg. However, a higher percentage of hospital staff showed high DBP >85mmHg (8.1%) and DBP > 90mmHg (14.5%) as shown in table 4.10.

Table 4.10 Blood Pressure Levels of Uasin Gishu Level 5 Hospital Staff

Variable	Category	Frequency	Proportion (%)
Systolic BP(mmHg)	<130	110	80.6
	130-139	15	11.3
	>140	11	8.1
Diastolic BP(mmHg)	< 85	105	77.4
	85-89	11	8.1
	>90	20	14.5

Table 4.11 Diastolic Blood Pressure among different Cadres of Uasin Gishu Hospital staff

Cadres N (%)	DBP<85	DBP85-89	DBP>90
Clinical officers	9(63.6)	3(27.3)	1(9.1)
Dentist	6(100.0)	0(0.0)	0(0.0)
Nurses	24(71.9)	4(9.4)	8(18.8)
Pharmaceutical personnel	4(66.7)	0(0.0)	2(33.3)
Laboratory workers	7(70.0)	1(10.0)	2(20.0)
Dieticians and nutritionists	3(100.0)	0(0.0)	0(0.0)
Other health workers	35(79.5)	3(6.8)	6(13.6)
Health management and support workers	15(91.7)	0(0.0)	3(8.3)
Total	103(77.4)	11(8.1)	22(14.5)

According to table 4.11 pharmaceutical personnel, laboratory workers, nurses and other health workers were found to have high numbers of hypertensive individuals (diastolic blood pressure of > 90mmHg) among their staff. This could be explained by the fact

that pharmaceutical personnel, laboratory workers, nurses, were experiencing high stress among stressor too much work in a given time. Also, their work was done in shifts and this could be a contributing factor to their high blood pressure Dentists Dieticians and nutritionist showed normal blood pressure (DBP< 85 mmHg) among their staff.

4.8 Relationship among Socio-demographic characteristics and Blood Pressure Levels of hospital staff

In table 4.12, it is shown that there was a highly significant positive relationship (r= 0.348, p-value = <0.001) between age and BMI which means that as age increases there was a high chance of BMI increasing. A highly significant positive relationship (r= 0.378, p-value = < 0.001; r= 0.444, p-value = < 0.001) was observed between age and SBP; age and DBP indicating that BP increases with age. There was a negative significant relationship (r= -0.261, p-value= 0.016) between education and DBP implying that as education increased DBP decreased. The results also showed a significant positive relationship (r= 0.258, p-value= 0.004) between household size and DBP that is, as the number of household members increased there was an increase in DBP (Table 4.12).

Table 4.12 Relationships between Socio-demographic Characteristics and Blood pressure using Pearson Correlation test among Uasin Gishu Level 5 Hospital staff

Relationships	R	p-value
Age and BMI	0.348**	<.001
Age and DBP	0.444**	<.001
Age and SBP	0.378**	<.001
Income and DBP	0.099	0.276
Education and DBP	-0.261*	0.016
HH number and DBP	0.258**	0.004

***Correlation is significant at the 0.05 level (2 tailed).**

****Correlation is significant at the 0.01 level (2-tailed).**

4.9 Relationship between Nutritional status and Blood Pressure Levels

Pearson correlation test showed a significant positive relationship (*r*= 0.229, p-value= 0.011) was found between BMI and DBP implying that BMI significantly influenced BP. Waist hip ratio was found to positively influence DBP (*r*= 0.273, p-value= 0.002) meaning as WHR increased DBP increased (Table 4.13).

Table 4.13 Analysis between Nutritional Status and Blood pressure using Pearson Correlation test among Uasin Gishu Level 5 Hospital staff

Relationships	R	p-value
BMI and SBP	0.289**	0.001
BMI and DBP	0.229*	0.011
WHR and SBP	0.355**	<.001
WHR and DBP	0.273**	0.002

***Correlation is significant at the 0.05 level (2 tailed).**

****Correlation is significant at the 0.01 level (2-tailed).**

4.10 Relationship between Dietary practices and blood pressure of the Hospital staff

The relationship between intake of selected nutrients and blood pressure was tested using Pearson correlation test. There was no significant relationship observed between dietary intake of different nutrients and blood pressure levels (Table 4.14). Sodium intake showed a negative relationship that was not statistically significant.

Table 4.14 Relationship between Intake of selected nutrients and Blood pressure among Uasin Gishu Level 5 Hospital staff

Dietary intake and BP	R	p-value
Sodium and DBP	-0.039	0.668
Potassium and DBP	0.165	0.068
Calcium	0.033	0.716
Vitamin C	0.085	0.349
PUFA	0.041	0.654
Cholesterol	0.035	0.697
Dietary fibre	0.100	0.272
Carbohydrates	0.118	0.192
Fats	0.033	0.713

***Correlation is significant at the 0.05 level (2 tailed).**

****Correlation is significant at the 0.01 level (2-tailed).**

4.11 Correlation between Physical Activity and Blood Pressure Levels among Hospital staff

Pearson correlation was used to test the relationship between physical activity and blood pressure. There was a negative relationship observed between physical activity level and blood pressure that was not statistically significant (r= -0.100, p-value = 0.271) this means that as activity level increased there was a decrease in diastolic blood pressure (Table 4.15).

Table 4.15 Relationships between Physical activity level and Blood pressure using Pearson Correlation test among Uasin Gishu Level 5 Hospital staff

Relationships	R	p-value
Physical activity and DBP	-0.100	0.271

****Correlation is significant at the 0.01 level (2-tailed).**

4.12 Relationship between Occupational Stress and Blood Pressure

The relationship between occupational stress and blood pressure levels was tested using Pearson correlation as shown in table 4.16. There was no significant relationship found between occupational stress and blood pressure, although a negative relationship was observed.

Table 4.16 Relationships between Occupational Stress and blood pressure using Pearson

Correlation test among Uasin Gishu Level 5 Hospital staff

Relationships	R	p-value
Occupational stress and DBP	-0.068	0.451

***Correlation is significant at the 0.05 level (2 tailed).**

4.13 Association among Other Variables

Chi-square test revealed a significant association among other selected variables. Marital status was found associated with DBP ($\chi 2 = 308.107$, df = 248, p-value = 0.006) among the hospital staff. There was no association between alcohol use and DBP. Also, an association was found between gender and BMI ($\chi 2 = 14.256$, df = 4, p-value = 0.007) that implies that being of a certain gender as an influence on your BMI. Gender was also found positively associated with physical activity (Table 4.17).

Table 4.17 Association among other Variables of Uasin Gishu Level 5 Hospital Staff

Variables	χ^2	**P-value**	**Df**
Marital status and DBP	308.107	0.006*	248
Gender and BMI	14.256	0.007*	4
Gender and Physical activity	12.813	<0.001*	1
Alcohol use DBP	56.103	0.687	62

CHAPTER FIVE: DISCUSSION

5.1 Socio-demographic and Economic Factors of the Participants and Blood Pressure

Socio-economic and demographic factors have been found to affect blood pressure and a risk factor for hypertension (Abubakar *et al.,* 2009). In the current study, age was found to have a highly significant relationship with blood pressure. As age advanced there was an increase in the prevalence of high blood pressure as it has been observed in several other studies including one involving Nigerian health service providers (Iwuala *et al.,* 2015) and Kenyatta University employees (Mogesi, 2011). The average household size of the participants was 3.9±1.88 which agrees with KDHS (2014) which reported average Kenyan households as at 3.9 members per household. There was a positive significant relationship found between household size and diastolic blood pressure similar to a study by Kannan (2016) who reported that increased family size was associated with HBP. In the current study, marital status was found to associate with DBP these could be attributed to the increase in household size since the household size was found to correlate with DBP similar to findings by (Mbijiwe, Chenge & Munyaka, (2018) among hypertensive individuals attending Kiambu Hospital.

In the present study, 96.4% of the respondent had attained college and higher education and this observation closely agree with a study by Tran *et al*. (2011) among working adults in Ethiopia that reported 91.9% males and 77.7% females had their education level at diploma and higher. Furthermore, Bosu (2016) and Asresahegn *et al*. (2017) indicated that those who had low levels of education were two times more likely to be

hypertensive than those with a high level of education, a report which agrees with the current study that found an association between education and SBP. However, Yuan *et al.* (2016) reported that illiterate study subjects had a lower prevalence of high BP as compared to literate counterparts which are contrary to the current findings which show that those with high education level had low BP. In the current study, high income was associated with increased BMI that influenced DBP. This was in agreement with research findings from a study involving adults in Ethiopia and workers in west Africa that showed blood pressure levels increase with high socioeconomic status (Asresahegn, *et al*., &; Bosu 2016). However, Moussa *et al.* (2016) and Iwuala *et al.* (2015) reported that low family income was associated with elevated blood pressure among university students and Nigerian health service providers.

5.2 Smoking and Alcohol Intake by Respondents and Blood Pressure

Smoking and alcohol use are some of the relevant influencers of blood pressure since high consumption induces hypertension (Husain, Ansari, & Ferder, 2014). Fewer hospital staff were current smokers a value close to that reported by Nobahar & Razavi (2015) who reported that 1.8% of health practitioners in Iran were smokers. However, the results of the current study differ with those of Cavagioni & Pierin (2012) who reported that 20.1% of health professionals in Brazil were smokers. Another study conducted by Mitwalli *et al*. (2013) among health professional in Saudi Arabia showed that 8.3% of his participants were smokers. In the current study, 25.7% of the study population were found to be consuming alcohol, a value slightly higher than the values of 19.3% reported in stepwise survey (2015) among adults in Kenya. The results of the

current study regarding alcohol consumption differed from those of Cavagioni & Pierin (2012) who reported that 47% of Brazilian hypertensive health care professionals were consuming alcohol. In the present study majority (50%) of the hospital staff were consuming alcohols with meals. According to Boban *et al.* (2016), alcohol drinking is found to affect food intake by increasing appetite and reducing satiety by influencing hormone leptin and ghrelin related to satiety leading to increased BMI. Drinking alcohol together with meals is said to help in ethanol metabolism and elimination. Alcohol use was found to be negatively associated with SBP though the results were not statistically significant which means there was a decrease of SBP with alcohol intake. In the current study, a positive significant relationship was found between alcohol use and BMI which in turn influenced SBP and DBP. This was in agreement with the findings of Hee-Ju, Ik-Rae *et al.* (2016) who found alcohol use to increase body weight, body fats and BMI that elevated SBP. In the present study, there was no association found between alcohol consumption with increased blood pressure levels.

5.3 Occupational Stress of Respondents and Blood Pressure

Work stress has always been seen to affect job performance including the occurrence of accidents at work, low productivity and causing illness (Gautam *et al*., 2016). In this study, the prevalence of work-related stress was 23% which is in close agreement with Owolabi *et al*. (2012) who reported that 26.2% of Nigerian health workers experienced work-related stress. However, the percentage (23%) of health workers that experienced work-related stress in the current study differ from the reported 44.4% by Mitwalli *et al*. (2013) among health professionals in Saudi Arabia. In the current study, no statistically

significant association was found between occupational stress and blood pressure among hospital staff.

5.4 Dietary Practices of Hospital staff and Blood Pressure

The main micro-nutrients of concern known to influence blood pressure include sodium, potassium, calcium, and vitamin C since these affect endothelium function (Houston & Harper, 2008). Endothelium dysfunction can cause atherosclerosis and cardiovascular diseases such as hypertension (Brandes, 2014). Results from the current study indicate that hospital staff were not meeting RDA for micro-nutrients potassium, sodium, calcium in female, vitamin C in males and dietary fibre. These findings agree with those of Willett (2017), who found that potassium, dietary fiber; calcium and Vitamin C nutrients were consumed below the RDA in the American adult population. According to Maillot et al. (2013), food modelling patterns of 2010 shows that sodium requirements of 2300mg were incompatible with RDA of potassium 2400-3200 mg even with healthy nutritionally adequate diets. He argues that decrease of sodium intake in the diet by two-thirds may not lead to recommended potassium intake when one consumes a healthy diet of low energy, which is in agreement with the present study in which potassium and sodium intake were found to be below the recommended amounts. Hospital staff were consuming less of tubers and roots (27.3%) such as sweet potatoes reflected in IDDS which could explain low levels of potassium intake among the respondents. Adequate intake of potassium increases glomerular filtration and vasodilation rate as it decreases renin level, renal sodium reabsorption, platelet aggregation and reactive oxygen species production (Yokoyama, 2014).

In the current study, the energy intake of the male hospital staff was 2318 kcal a value slightly above the recommended 2300 kilocalories while that of the female hospital staff was found to be 2399 kcal a value above the recommended 2000 kilocalories by USDA (2015). Cholesterol intake of 219mg in female respondents was higher than the recommended <200mg, cholesterol has a tendency of increasing LDL levels and is, therefore, a risk factor for high blood pressure. Poly-unsaturated fatty acids intake was below the recommended intake level. Unsaturated fats help lower LDLs and improve HDLs. The dietary fiber intake of 16g and 18g in male and female hospital staff respectively was lower than the recommended value of >25g and this could be attributed to a high intake of refined foods. Dietary fiber is present in unprocessed foods and natural plant foods, vegetables and fruits. Majority of the respondents were living in an urban and consumption of unprocessed food is always viewed as uncivilized and of low economic status, these could be the reason why they were not meeting recommended dietary intakes of fibre. Low intake of calcium is reported to result in muscle contractions raising blood pressure due to increased adrenal gland activity (Gupta et al., 2017). There is a need to increase intake of fruits, legumes, nuts and seeds to improve on intake of these vital nutrients especially soluble fibre.

5.5 Nutritional Status of the hospital staff and Blood Pressure

Data from literature review demonstrate the importance of overweight and obesity as risk factors for high blood pressure. For example, the Framingham study revealed that 70% of the newly diagnosed hypertension cases are due to excess weight (Cavagioni & Pierin, 2012). In the present study, more than half of the respondents (63%) were found

to have a higher than normal BMI with 35% being overweight and 28.4% being obese. The prevalence of obesity was found to be higher in female than male hospital staff as Chi-square showed a significant association between gender and BMI. Females were significantly more likely to become overweight and obese than males as revealed by odds ratio measurements. In this study, female respondents were physically inactive showing sedentary lifestyle which could be the reason why they were more obese than their counterparts. The prevalence of obesity observed in the current study among female hospital staff agrees with Tran *et al.* (2011), who reported high rates of obesity and overweight in females than in males. This could be attributed to the fact that being fat is seen as beauty and a sign of good socio-economic status (Kannan, 2016). Results findings also showed a positive significant relationship between income and BMI, therefore the reason for this phenomenon. In the current study, 35% of the hospital staff were found to be overweight and this is in agreement with the reported value of 38.4% prevalence of overweight by Osei-Yeboah *et al.* (2018) among health care workers in Ghana. Another study carried out by Mitwalli *et al.* (2013) reported that 19.4% of health professionals in Saudi Arabia were obese which is close to the current study results of 28.4% prevalence of obesity. In the present study, the prevalence of both overweight and obesity was 63.4% which agrees with Cavagioni & Pierin (2012) who reported a 66% prevalence of overweight and obesity among Brazilian health care professional. Compared with other cadres, nurses were found to be more obese than being overweight. Laboratory workers, dieticians and health management and support workers showed more overweight than being obese. Obesity is associated with an

increased rate of absenteeism, morbidity, mortality, work-related injuries, decreased productivity and early retirement which in turn increase DALY. Moreover, obesity is linked to cardiovascular diseases in this case hypertension and other non-communicable diseases such as diabetes and cancers. Furthermore, health workers are to be an example of body weight as well as educators and health promoters. Health workers need to be an agent of change in overweight and obesity by what they are than what they say (Osei-Yeboah *et al*., 2018; Iwuala *et al.*, 2015).

In this study, a BMI of > 25 was associated with high blood pressure an observation that agreed with previous studies (Helelo *et al*., 2014; Chowdhury *et al.*, 2016, Asresahegn *et al*., 2017). The current study showed a strong positive relationship between BMI and blood pressure which was in agreement with the findings from a study carried out among Kenyatta University employees and Kenya Defense Forces where a strong association between obesity and BP was found (Mogesi 2011; Mundan *et al.*, 2015). The current study findings also agree with Iwuala *et al.* (2015) who reported that the majority of Nigeria health service providers were overweight and obese with a strong relationship between overweight and diastolic blood pressure. In the current study, a significant positive relationship was observed between central obesity and blood pressure. According to Hulzebosch *et al.* (2015) respondents in one slum in Kenya had central obesity with the majority being males who also had high SBP. In the current study, a mean WHR of 0.8967±0.8023 was observed, female and male hospital staff showing WHR of 0.8811±0.8328 and 0.9213±0.8023 respectively. Male hospital

staff in the current study showed higher mean SBP of 121.78mmHg compared to 117.22mgHg observed in female hospital staff.

5.6 Physical Activity and Blood Pressure

Physical inactivity has been linked to hypertension and cited as one of the major risk factors for high blood pressure (Alwan 2011). This study found out that the majority of the hospital staff (86%) were physically active. More female than male participants were found to be physically inactive with chi-square showing a significant association between gender and physical activity level. This could explain why more women were obese and overweight than men. Fewer hospital staff (14%) showed physical inactivity close to 11.1% reported by Mitwalli *et al.,* 2013 among Saudi health professionals. In the present study, nurses were found to be more physically inactive compared to other cadres of health workers. These results are in agreement with a study among health workers in Nigeria which reported that nurses were physically inactive than doctors and other health workers (Iwuala *et al.*, 2015).

There was a negative but insignificant relationship found between physical activity level and diastolic blood pressure in this study, implying that an increase in physical activity reduces blood pressure. Results of this study agree with a study by Bento *et al*. (2015) who reported that among his study subjects there was reduced blood pressure with increased physical activity levels. According to Olack *et al*. (2015) and Chien, Ying and Lee (2015) low physical activity was associated with high blood pressure in

their study participants which was not observed in the current study since the majority were found to be physically active.

5.7 Prevalence of Hypertension

There is a need to raise awareness about blood pressure and these can only be achieved if health care professionals incorporate it to their daily health care services and by being exemplary to the entire population (Mitwalli *et al*., 2013). In this study, the prevalence of high blood pressure as determined by a diastolic blood pressure of above 85mmHg was 22.6% among Uasin Gishu hospital staff indicating high prevalence than expected, which agree with a reported range of 15.5-37.5% prevalence among health workers in West Africa and health professional in Riyadh tertiary hospital (Bosu 2016; Mitwalli *et al*., 2013). It is also close to the estimated prevalence of HBP reported by MoH that is between 23-24% as reported by the Step Survey (2015) on non-communicable disease risk factors. The study result is in agreement with that of a slum in Kenya that reported a prevalence of 22.8% (Joshi *et al*., 2014). The high HBP observed in the current study could be attributed to low intake of potassium which is the mineral that lowers BP and also to the low dietary soluble fiber, vitamin C and calcium intake below the RDI as indicated by 24hour recall. Moreover, this could be due to physical inactivity and high prevalence of overweight, obesity and central obesity that was reported in the current findings that influenced their blood pressure levels. It was noted that among the hospital staff hypertension prevalence was lower (22.6%) compared to 25.4% reported in a national prevalence among adults in Kenya (Mohamed *et al*., 2018). This could be because health workers were educated since study results found out that education was

negatively correlated with blood pressure. The prevalence of HBP observed in the current study is close to the 21% reported by Health Heart Africa (HHA) and the 20.1% reported by Owolabi *et al*. (2015) among health workforce in Nigeria. However, the findings of the current study were in contrary to findings by Cavagioni & Pierin (2012) who reported an HBP prevalence of 33% among Brazilian health professionals, and another by Sharma *et al.*, (2014) that showed 10% prevalence among health care professionals in India. Among the different cadres, pharmaceutical personnel, laboratory workers, and nurses were found to have higher blood pressure rates than the rest and this could be attributed to the fact that they were also experiencing high occupational stress than the other cadres.

5.8 Relationships between Variables and Blood Pressure

The first hypothesis that stated there is no significant relationship between socio-demographic factors and blood pressure was rejected since statistical results showed that education, family size, income and age were significantly related to blood pressure. The second hypothesis that stated there is no significant relationship between occupational stress and blood pressure was not rejected since there was no statistically significant relationship found between occupational stress and blood pressure levels. Dietary practices and blood pressure was found not significantly related therefore the third hypothesis that stated there is no significant relationship between dietary practices and blood pressure was not rejected.

The hypothesis that stated there is no significant relationship between nutritional status and blood pressure was rejected since there was a significant relationship found

between BMI and blood pressure, also a significant statistical relationship between WHR with blood pressure was observed. There was a negative and not significant relationship that was found between physical activity and blood pressure, therefore this hypothesis was not rejected.

In summary, there was poor nutritional status among hospital staff as reflected by more than 50% of the hospital staff have a higher than normal BMI and central obesity. This could be attributed to socio-demographic and economic factors especially high income, low education, alcohol use and age. Low levels of physical activity and low intake of micronutrients was observed. In the current study, the lifestyle of health staff did not translate to any action to control hypertension and CVD.

CHAPTER SIX: SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary of the Findings

This study aimed at establishing blood pressure levels and its associated risk factors among hospital staff at Uasin Gishu level 5 hospital, Uasin Gishu County.

6.1.1 Socio-economic and demographic Factors

In the current study, a significant relationship was found between age, education level, household size, and income with blood pressure. Education level was found to negatively influence blood pressure while household size, age and income were positively related to blood pressure. In this study, marital status was found to be associated with blood pressure. These imply that socio-economic factors influenced BP.

6.1.2 Dietary Practices

In the present findings, results show that participants were not meeting RDI for micronutrients as revealed by the 24-hour dietary recall. Dietary intake of potassium, vitamin C, calcium and dietary fibre were below recommended values although these nutrients are known to positively influence blood pressure. Energy intake and cholesterol intake were high in women above the recommended dietary allowance. Majority of the hospital staff had medium dietary diversity score between 5-9 food groups. There was no relationship found between dietary practice and BP.

6.1.3 Nutritional Status of Hospital staff

A majority (63%) of the hospital staff had their BMI above 25 Kg/m^2 with 35% being overweight, 28.4% being obese and 66.9% having central obesity. Obesity and overweight were more prevalent in females than male participants with significant

association of gender with BMI. Age, high income, alcohol use was found to be related with BMI which in turn affected blood pressure.

6.1.4 Physical Activity and Blood Pressure

Majority of the hospital staff had adequate physical activity while few had inadequate activity level than recommended. A significant association was observed between gender and physical activity level with males found to have the recommended physical activity levels, unlike women who were found to be physically inactive. No significant correlation was found between physical activity levels and BP although a negative relationship was seen.

6.1.5 Blood Pressure Levels

Several of the hospital staff had normal systolic and diastolic blood pressure although DBP were more elevated than SBP. Prevalence of blood pressure was 22.6%.

6.2 Conclusion

Socio-economic and demographic factors have a significant contribution to the blood pressure levels of the hospital staff. Age and household size, level of education and marital status are associated with blood pressure levels. Those married and with large household sizes, are likely to have high blood pressure. Dietary practices are found not to affect blood pressure levels and therefore their high blood pressure levels can be attributed to other risk factors. The RDI for vital nutrients important for the prevention of HBP were not all met but could be due to bias in 24hr recall method but their dietary practices are adequate as seen by dietary diversity score and seven-day food frequency.

Occupational stress and physical activity levels among hospital staff are not identified as risk factors to high blood pressure levels but this would be important for their nutritional status especially in female where gender is associated with physical activity. High prevalence of overweight and obesity is observed among health staff of Uasin Gishu hospital and this is the main contributing risk factor to the high prevalence of high blood pressure. Therefore, we can conclude that socio-economic, demographic factors and nutritional status influenced blood pressure levels of Uasin- Gishu hospital staff.

6.3 Recommendations

Economic and demographic factors that were found to affect blood pressure can be addressed by raising the awareness on associated modifiable risks factors to enable prevention measures to be adhered to. Good choices of healthy foods avoiding processed food items will be of help to improve on their dietary intake. Adapting changes such as not sitting for long hours, increasing physical activity by walking for at least 30 minutes a day and engaging in outdoor games on weekends could help to improve on the nutritional status of the health workers and reduce on a sedentary lifestyle. County and hospital management should employ enough workers to curb the shortage and reduce the workload that is the cause of stress and allow more time for relaxation and leisure time. Work out programs for weight reduction are required to improve on their nutritional status to reduce hypertension risk factors among these professionals. Moderate alcohol consumption and smoking cessation are behavioural factors to be practised by health workers. Frequent measurement of blood pressure

should be done to check on blood pressure levels to enable prevention and treatment in time among the hospital staff. Combining more than one intervention may decrease the prevalence of high blood pressure among health staff in Uasin Gishu and this may result in a better channel of communication to the entire population.

6.3.1 Recommendation for Policy

The policy should be strengthening on prevention of high blood pressure risk factors and changes be done on workplace to improve on blood pressure levels and meet global target goals. Kenya Cardiac Society, International Society of hypertension and MoH should promote national guidelines for cardiovascular diseases among the specific groups such as health staff with a periodical screening of their blood pressure and nutritional status. This will help to reduce the prevalence of hypertension and DALY. Ministry of Health, Uasin Gishu County and hospital management should come up with strategies and intervention to promote healthy practices among its workers. Reminders should be put in place to check on the progress and encourage them on better practices.

6.3.2 Recommendation for Practice

There is a need to improve on nutritional and healthy practices among health staff by proper advice and motivation. This can be done through seminars, continuous medical education by informed personnel such as dieticians to help hospital staff make informed choices in their food intake and be an example to the entire community. Behavioural factors such as sedentary lifestyle should be discouraged among Uasin Gishu health professionals since it affects both nutritional status and blood pressure. There was a low intake of key micronutrients that influence blood pressure which can be a risk factor and

therefore the promotion of healthy selection or proper selection of foods is necessary among Uasin Gishu hospital staff. Opportunities to increase physical activity level and ways to reduce overweight and obesity should be put in place such as games within playgrounds at the workplace.

6.3.3 Recommendation for Further Research

The current study focused on the risk factors of blood pressure among hospital staff. Another study on the knowledge, attitude and perceptions could be conducted to identify gaps in this area to inform policy and improve the channel of communication to community members. A comparative study can be done on other specific groups to establish if there is any difference among health staff on the risk factors affecting blood pressure and these groups. A similar study can also be conducted on serum lipid profile and key micronutrients on how it can influence blood pressure.

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APPENDICES

APPENDIX A: LETTER OF INTRODUCTION AND INFORMED CONSENT

Dear respondent,

My name is RAEL SUM a postgraduate student at Kenyatta University pursuing a Master of Science degree in Food, Nutrition and dietetics. I am carrying out a research on blood pressure and associated risk factors among staff in Uasin Gishu level 5 hospital. This study will help you the respondent know your health status and help improve your productivity. Also these will help county government come up with policies and programs to improve the health of its workers and add literature for further studies in the area of hypertension and cardiovascular diseases. Your participation is voluntary.

Procedure to be followed

The research entails a semi-structured questionnaire with three sections including; socio-demographic characteristics, dietary practices questionnaires such as 24hr recall, food frequency questionnaire and dietary diversity questionnaire. Furthermore, it will ask questions on behavioral risk factors such as alcohol use, smoking and occupational stress. In addition, global physical activity questionnaire will be administered to assess the level, nature and intensity of physical activity. Please answer at your best of understanding with accurate information. A trained nurse will then take your blood pressure and nutritional status that is weight, height and hip waist ratio. These procedures will take not more than one hour and your co-operation will be highly appreciated.

Benefits

This study will give you an understanding of your current dietary habits, physical activity level, nutritional status and your blood pressure measurements and relevant advice will be given when need be. Findings of this study will be geared towards awareness and formulation of policies and programmes for the prevention and management of hypertension among health workers.

Possible risks and discomfort

There is no foreseen risk, but if anything makes you uncomfortable you are at liberty to stop.

Compensation

Participation is voluntary and there is no any form of payment.

Community consideration

All those respondents with high blood pressure will be given relevant nutrition advice and referred to the Nutritionist and doctor for further assistance.

Care and protection for the study participants

Procedure will be well explained to the participants and will ensure no risk is associated with the study. Also they will be informed of the right to withdraw from the study with no penalties.

Confidentiality

Information will be treated with utmost confidentiality and will not be used for any other purpose apart from this study.

If you have any questions you may contact:

Rael sum or Kenyatta University

P.O BOX 43844 P.O BOX 43844

Nairobi. Kenya. Nairobi, Kenya.

Tel: +254 0720040212 Tel:+254 20 8710901

Respondent statement

The above information regarding my participation is clear to me and I voluntarily agree to participate.

Respondent signature or Thumb print _____

Date _____

Interviewer's statements

I certify that, I the undersigned have explained to the purpose and procedure, the potential benefits and possible risks associated with participating in this study to the above individual.

Interviewer name _____

Signature _____

Date _____

APPENDIX B: SEMI-STRUCTURED QUESTIONNAIRE

Pre- interview information Interview date:

Tick where appropriate

1=Physicians 2=Dentists 3=Nursing and midwifery personnel 4=Pharmaceutical personnel

5=Laboratory health workers 6=Dieticians and nutritionists 7= Other health workers

8=Health management and support workers

Section 1: Socio-demographic characteristics (Please tick where appropriate)

Gender: 1= Male 2= Female	Age: What is your date of birth? or how old are you? _____
Marital status: 1= Never married 2= Currently Married 3= Separated 4= Divorced 5= Widowed 6= Cohabitating	Level of education: 1= No formal schooling 2= less than primary school 3= Primary school completed 4= High school completed 5= Collage/university completed 6= Post graduate degree
Household number:	Do you own the land? 0=No 1=Yes
Do you have electricity? 1=Yes 2=No	What is the size of this farm in acres? _____
Income per month: 1= < 30000 2 = 30001-50000 3 = 50001- 70000 4=70001-90000 5 = 90001-110000 6 = >110001	What is the main source of income for the household? 1= Agricultural activities 2= Salary 3= Business 4= Donations from friends/Relatives 5= Loans

Possession of livestock:

Livestock	Number owned
Cow	

Sheep	
Goat	
Donkey	
Chicken	

Type of toilet used: 0=None 1= Pit Latrine 2= Ventilated Pit Latrine 3= Flush toilet	Roof type of main house construction material: 1=Grass thatch 2=Iron sheets 3=Tiles 4=other-specify
Floor type of main house construction material 1=Earth Soil 2=Cement 3=Wood 4=Tiles 5= Other-specify	Wall type of main house construction material: 1=Mud 2=Wood 3=Brick/stone/cement 4=other-specify

Number of assets owned in a housed hold

Asset name	Number owned
Radio	
Mobile phone	
Television	
Bicycle	
Car/pick up/lorry	
Motorcycle	
Computer	
Fridge	
Gas stove	
Paraffin stove	
Electric stove/oven	
Generator	
Solar panel	

Section 2: Modifiable risk factors

2.1: Behavioral factors

2.1.1 Tobacco use

1. Do you currently smoke any form of tobacco products? Such as cigarettes, cigars or

pipes?

1 = Yes 2 = No (if yes go to 2, if no go to 5)

2. Do you currently smoke tobacco products daily? 1= Yes 2= No

3. How old were you when you **first started** smoking daily? _____

4. On average how many do you smoke each day? _____

5. In the past did you ever smoke daily? 1= Yes 2= No (If yes go to 6)

6 (a) How old were you when you stopped to smoke daily? _____ (If don't Know go to 6(b).)

6(b) How long did you stop smoking daily? Years_____ Months _____ Weeks _____

7. Do you currently use smokeless tobacco such as snuff, chewing tobacco or betel?

1= Yes 2= No

8. Do you currently use smokeless tobacco products daily? 1= Yes 2= No (if no go to 11)

9. On average how many times a day do you use? _____

10. In the past did you ever use smokeless tobacco? 1= Yes 2= No

11. During the past 7 days, on how many days did someone in your home smoke when you were present? _____

12. During the past seven days, on how many days did someone smoke in closed areas in your workplace? _____

2.1.2 Alcohol consumption

1. Have you **ever** consumed alcohol drink such as beer, wine spirit, fermented

cider or chaggaa? 1= Yes 2= No

2. Have you consumed an alcohol drink within the past 12 months? 1= Yes

   2= No

3. During the past 12months, how frequently have you had at least one alcoholic drink?

   1= daily
   2= 5-6 day per week
   3= 1-4 days per week
   4= 1-3 days per month
   5= less than once a month

4. Have you consumed an alcoholic drink within the past 30 days? 1= Yes 2= No

5. During the past 30 days, on how many occasion did you have at least one alcoholic drink? _____

6. During the past 30 days, when you drank alcohol on average, how many times did you have standard alcoholic **For men: five or more for women: four or more** in a single alcoholic drink occasion? _____

7. During the past 30 days when you consumed an alcohol drink, how often was it with meals? 1= Usually with meals
   2= Sometimes with meals
   3= Rarely with meals
   4= Never with meals

8. During each of the past 7 days, how many standard alcoholic drink did you have each day? Monday _____
   Tuesday _____
   Wednesday _____
   Thursday _____
   Friday _____
   Saturday _____
   Sunday _____

2.1.3 Occupational stress

Occupational Stressors

Circle the number that shows how much stress each of the following people, places or events causes you. Write in the space marked other, any stressor that aren't listed.

1. No stress 2. Slight amount of stress 3. Moderate amount of stress 4. A lot of stress 5. Extremely high stress

1) A colleague at work	1 2 3 4 5
2) My boss	1 2 3 4 5
3) Too much work to complete within a given time	1 2 3 4 5
4) Worry about failing	1 2 3 4 5
5) Fear of not completing work in time	1 2 3 4 5
6) Fear of being ridiculed	1 2 3 4 5
7) Fear of not meeting your employees' expectations	1 2 3 4 5
8) Fear of shift work	1 2 3 4 5
9) Other	**1 2 3 4 5**

2.2: Dietary practices questionnaires

Section 2.2.1: 24 hr. dietary recall questionnaires

What did you eat and drink in the last 24 hours? (Be thorough)

Time /meal	**Name of dish/food**	**Name and Amount of ingredient used**	**Amount eaten**	**Method of preparation**
Breakfast				
Snack				
Lunch				
Snack				
Supper				
Snack				

Section 2.2.2: 7 Days-Food frequency questionnaire

How often, in the past one week did you eat the following? (Tick where appropriate).

	0	**Daily**	**2-3days**	**4-6days**	**Never**
Cereals, carbohydrates, starch					
White bread					
Brown Bread					
Ugali (sorgum/Maize)					
White rice					
Brown Rice					
Spaghetti, Pasta ,Noddules					
White Chapati					
Brown chapati					
Githeri					
Mokimo					
Porrigde					
Mandazi					
Roasted/ boiled maize					
Breakfast cereals (cornflakes, weetabix etc)					
Pancakes					
Others (specify)					
Roots and tubers					
Potatoes					
Sweet potatoes					
Yams/arrow roots					
Cassava					
Green bananas					
Others (specify)					
Pulses ,Nuts and legumes					
Peas (Minji)					
Beans					
Lentils (Kamande)					
Green grams (Ndengu)					
Simsim					
Groundnuts,					
Soya beans					

Others(specify)					
Dairy products					
Whole milk					
Yorghurt					
Ice cream					
Butter					
Ghee					
Margarine					
Cheese					
Cream					
Others(specify)					
Meat, meat products and eggs					
Beef					
Mutton					
Fish					
Chicken					
Sausages/smokies					
Bacon					
Pork					
Matumbo					
Eggs					
Others(specify)					
Vegetables					
Kales					
Cabbages					
Spinach					
Tomatoes					
Onions					
Garlic					
Pumpkin					
Carrots					
Cucumber					
French beans (Michiri)					
African traditional eg Kunde, Managu, Terere, Sangeti, pumkin leaves					
Others (specify)					
Fruits					

Banana					
Manogoes					
Oranges					
Grape fruits					
Lemom					
Pawpaw					
Melon					
Avocado					
Pineapple					
Passion					
Apples and pears					
Others specify					
Sugar Alternatives and sweets					
Sugar					
Honey					
Chocolates					
Cakes					
Biscuits					
Sweets					
Jam					
Juices					
Sodas					
Fats, spreads and oil					
Peanut butter					
Solid cooking fats					
Cooking Oils					
Margarine					
Mayonnaise					
Others (specify)					

Section 2.2.3: Individual dietary diversity questionnaire

Please describe the foods (meals and snacks) that you ate yesterday during the day and night, whether at home of outside the home. Start with the first food eaten in the morning,

Qtn No	Food group	Examples	YES=1 NO=2
1	CEREALS	breads, noodles, biscuits, cookies or any other food made from millet, sorghum, maize, rice, wheat e.g. ugali, porridge, githeri ,pastes or any other locally available grains	
2	VITAMIN A RICHVEGETABLES AND TUBERS	pumpkin, carrot squash, or sweet potatoes that are yellow or orange inside + other locally available vitamin A-rich vegetables	
3	WHITE TUBERS AND ROOTS	white potatoes, white yams ,cassavas or foods made from roots	
4	DARK GREEN LEAFY VEGETABLES	sweet pepper, dark green leafy vegetables, including wild ones+ locally available vitamin-A rich leaves such as cassava leaves etc.	
5	OTHER VEGETABLES	other vegetables including wild vegetables	
6	VITAMIN A RICH FRUITS	ripe mangoes, papayas + other locally available vitamin a rich fruits	
7	OTHER FRUITS	other fruits including wild fruits	
8	ORGANMEAT (IRON RICH)	liver, kidney, heart or other organ meat or blood-based foods	
9	FLESH MEATS	Beef, lamb, pork, goat, rabbit. wild game, chicken, duck or other birds	
10	EGGS		
11	FISH	fresh, dried or shellfish	
12	LEGUMES NUTS AND SEEDS	beans, peas, lentils, nuts, seeds or foods made from these	
13	MILK AND MILK PRODUCTS	milk, cheese, yoghurt or other milk products	
14	OILS AND FATS	Oils, fats or butter added to foods or used for cooking	
15	SWEETS	sugars, honey, sweetened sodas or sugary foods such as chocolates, sweets or candies	
16	COFFEE/ TEA	tea (black, green or ,herbal) or coffee	
			YES=1 NO=2

B	Did you eat anything	(Meal or snack) outside home yesterday?	

Adopted from FAO/Nutrition and Consumer Protection Divisions, version of February 2008

2.3: Global physical activity questionnaire

Question	Response	
Work		
Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like [carrying or lifting heavy loads, digging or construction work] for at least 10 minutes continuously?	Yes 1 No 2 If No, go to P 4	P1
In a typical week, on how many days do you do vigorous intensity activities as part of your work?	Number of days ⌊__⌋	P2
How much time do you spend doing vigorous-intensity activities at work on a typical day?	⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ Hours : minutes	P3 (a-b)
Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking [or carrying light loads] for at least 10 minutes continuously?	Yes 1 No 2 If No, go to P 7	P4
In a typical week, on how many days do you do moderate intensity activities as part of your work?	Number of days ⌊__⌋	P5
How much time do you spend doing moderate-intensity activities at work on a typical day?	⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ Hours : minutes	P6 (a-b)
Travel to and from places		

Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and	Yes 1 No 2 If No, go to	P7

from places?	P 10	
In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days ⌊__⌋	P8
How much time do you spend walking or bicycling for travel on a typical day?	Hours : minutes ⌊__⌋ : ⌊__⌋	P9 (a-b)

Question	Response	
Recreational activities		
The next questions exclude the work and transport activities that you have already mentioned. Now I would like to ask you about sports, fitness and recreational activities (leisure), [Insert relevant terms].		
Do you do any vigorous-intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate like [running or football] for at least 10 minutes continuously?	Yes 1 No 2 If No, go to P 13	P10
In a typical week, on how many days do you do vigorous intensity sports, fitness or recreational (leisure) activities?	Number of days ⌊__⌋	P11
How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Hours : minutes ⌊__⌋ : ⌊__⌋	P12 (a-b)
Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate such as brisk walking, [cycling, swimming, and volley ball] for at least 10 minutes continuously?	Yes 1 No 2 If No, go to P 16	P13

In a typical week, on how many days do you do moderate intensity sports, fitness or recreational (leisure) activities?	Number of days ⌊__⌋	P14
How much time do you spend doing moderate-intensity sports, fitness or recreational (leisure) activities on a typical day?	⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ Hours : minutes	P15 (a-b)
Sedentary behavior		
How much time do you usually spend sitting or reclining on a typical day?	Hours : minutes ⌊__⌋ ⌊__⌋ : ⌊__⌋⌊__⌋	P16 (a-b)

APPENDIX C: CLINICAL AND ANTHROPOMETRIC MEASUREMENTS

Sheet 1: Clinical analysis sheet- blood pressure

Questionnaire code : _____

Date of sampling : _____

Age of respondent: _____

Readings	1	2	3	Average
SBP(mm Hg)				
DBP(mm Hg)				
PULSE				

Sheet 2: Anthropometric measurements

Readings	**1**	**2**	**Average**
Height (m)			
Weight (Kgs)			
Waist circumference (cm)			
Hip circumference (cm)			

APPENDIX D: RESEARCH APPROVAL

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 810901 Ext. 4150

Internal Memo

FROM: Dean, Graduate School

DATE: 31st January, 2018

TO: Sum Jepchumba Rael
C/o Foods, Nutrition & Dietetics Dept.

REF: H60/33573/2015

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

We acknowledge receipt of your revised Research Proposal as per our recommendations raised by the Graduate School Board of 10th January, 2018 entitled **"Blood Pressure and Associated Risk Factors among Staff in Uasin Gishu Level 5 Hospital, Uasin Gishu County, Kenya".**

You may now proceed with your Data Collection, Subject to Clearance with Director, Ethics Office, Kenyatta University, Kenyatta University Management and Director General, National Commission for Science, Technology and Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking Forms per semester. The form has been developed to replace the Progress Report Forms. The Supervision Tracking Forms are available at the University's Website under Graduate School webpage downloads.

Thank you.

JULIA GITU
FOR: DEAN, GRADUATE SCHOOL

C.c. Chairman, Department of Foods, Nutrition & Dietetics

Supervisors:

1. Dr. Ann Munyaka
   C/o Department of Foods, Nutrition & Dietetics
   Kenyatta University

2. Dr. Regina Kamuhu
   C/o Department of Foods, Nutrition & Dietetics
   Kenyatta University

JG/lnn

APPENDIX E: ETHICAL CLEARANCE

KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Fax: 8711242/8711575
Email: kuerc.chairman@ku.ac.ke
kuerc.secretary@ku.ac.ke
Website: www.ku.ac.ke

P. O. Box 43844
Nairobi, 00100
Tel: 8710901/12

Our Ref: KU/ERC/APPROVAL/VOL.1 (154) Date: **14th June, 2018**

Sum Jepchumba Real
P.O BOX 50 - 30102
Burnt Forest (Kenya)

Dear Sum,

APPLICATION NUMBER PKU/810/I876 "BLOOD PRESSURE AND ASSOCIATED RISK FACTORS AMONG STAFF IN UASIN GISHU LEVEL 5 HOSPITAL, UASIN GISHU COUNTY, KENYA. "

1. **IDENTIFICATION OF PROTOCOL**

The application before the committee is with a research topic "**Blood Pressure and Associated Risk Factors Among Staff In Uasin Gishu Level 5 Hospital, Uasin Gishu County, Kenya.** " received on 9th February, 2018 and discussed on12th June, 2018.

2. **APPLICANT**

Sum Jepchumba Real

3. **SITE**

Uasin Gishu County, Kenya

4. **DECISION**

The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines and **APPROVED that the research may proceed for a period of ONE year from 12th June, 2018.**

5. ADVICE/CONDITIONS

i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.

ii. Serious and unexpected adverse events related to the conduct of the study are reported to this board immediately they occur.

iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.

iv. Submit an electronic copy of the protocol to KUERC.

When replying, kindly quote the application number above.

If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.

DR.TITUS KAHIGA
CHAIRMAN ETHICS REVIEW COMMITTEE

I .....Tepchumba..... accept the advice given and will fulfill the conditions therein.

Signature.....Tepchumba.....- Dated this day of.....31 July..... 2018.

cc.

DVC- Research, Innovation and Community Outreach.

R

APPENDIX F: RESEARCH AUTHORIZATION

NATIONAL COMMISSION FOR SCIENCE,
TECHNOLOGY AND INNOVATION

Telephone:+254-20-2213471,
2241349,3310571,2219420
Fax:+254-20-318245,318249
Email: dg@nacosti.go.ke
Website : www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/18/32955/24054**

Date: **19th July, 2018**

Rael Jepchumba Sum
Kenyatta University
P.O. Box 43844 – 00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Blood pressure and associated risks factors among staff in Uasin Gishu Level 5 Hospital, Uasin Gishu County, Kenya"*** I am pleased to inform you that you have been authorized to undertake research in **Uasin Gishu County** for the period ending **19th July, 2019.**

You are advised to report to **the County Commissioner, the County Director of Education and the County Director of Health Services, Uasin Gishu County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Uasin Gishu County.

The County Director of Education
Uasin Gishu County.