RISK FACTORS FOR HYPERTENSION AMONG PATIENTS AGED 18- 35 YEARS ATTENDING TENWEK MISSION HOSPITAL, BOMET COUNTY, KENYA

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Risk Factors for Hypertension among Patients Aged 18- 35 Years Attending Tenwek Mission Hospital, Bomet County, Kenya

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DECLARATION

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

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This thesis has been submitted for examination with our approval as the University Supervisors.

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DEDICATION

I dedicate this project to my loving husband Mr. Jack Okumu and my children, Adrian, Reagan and Myles for their unending loving, support and encouragement during my study period.

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ABBREVIATION AND ACRONYMS

ACE	Angiotensin Converting Enzyme
AID	Acquired Immune Deficiency Syndrome
APHRC	African Population and Health Research Center
BP	Blood Pressure
CARDIA	Coronary Artery Risk Development in Young Adults
CDC	Centre for Disease Control and Prevention
CVD	Cardiovascular Disease
d.f	degree of freedom
DALYs	Disability-Adjusted Life Years
HIV	Human Immune Virus
JNC	Joint National Committee
KNBS	Kenya National Bureau of Statistics
MOPC	Medical Outpatient Clinic
NCDs	Non communicable Diseases
NHLBI	National Heart, Lung, and Blood Institute
NIH	National Institute of Health
SES	Social Economic Status
SPSS	Statistical Package for Social Sciences
SSA	Sub-Sahara Africa.

U.S	United States
WHO	World Health Organization
WHR	Waist to Hip Ratio

DEFINITION OF TERMS

Angiotensin-converting enzyme inhibitors Drugs that help relax blood vessel (Sharma *et al.,* 2010).

Atherosclerosis Refers to the buildup of fats, cholesterol and other substances in and on your artery walls (plaques), which can restrict blood flow (Venkateswarlu *et al*., 2015)

Body Mass Index (BMI) Is a simple index of weight-for-height used to classify underweight, overweight and obesity in adults. It is also defined as the weight in kilograms divided by the square of the height in meters (kg/m2) (Letamo, 2011).

Cardiovascular Disease Is a class of diseases that involve the heart, the blood vessels (arteries, capillaries, and veins) or both (Sarwar *et al.,* 2015).

Cases Young adults already diagnosed with hypertension, reported in the hospital records as hypertensive, or reported taking antihypertensive medication at the time of interview (Colt *et al.,* 2011).

Co morbidity Is the presence of one or more additional diseases or disorders co-occurring with (that is, concomitant or concurrent with) a primary disease or disorder (Caughey *et al.,* 2008).

Controls Young adults attending the same outpatient service with no history of hypertension, but came for other services and whose blood pressure recorded normal at the time of data collection (Colt *et al.,* 2011).

Diastolic The bottom number, which is also the lower of the two numbers, measures the pressure in the arteries between heartbeats (when the heart muscle is resting between beats and refilling with blood) (Kitzman *et al.*, 2001).

Morbidity Refers to the disease state of an individual, or the incidence of illness in a population (Murray *et al.*, 1992).

Mortality Refers to the state of being mortal, or the incidence of death (number of deaths) in a population (Callaghan, 2012).

Normal pressure Systolic lower than 120 mm Hg, diastolic lower than 80 mm Hg (Kovesdy *et al.*, 2013).

Physical activity level physically active if he/she is engaged in exercises always, rare rating categorized as being inconsistent in exercising and never was not exercising at all (Bendor, 2006).

Prehypertension Systolic 120-139 mm Hg, diastolic 80-89 mm Hg (Materson *et al.*, 2017) .

Primary (essential) hypertension: Is hypertension that has no clear cause, but linked to genetics, poor diet, lack of exercise and obesity (Neel *et al.*, 1998).

Secondary hypertension caused by conditions that affects your kidneys, arteries, heart or endocrine system (Akpunonu *et al.*, 1996).

Stage 1 Systolic 140-159 mm Hg, diastolic 90-99 mm Hg (Brixius *et al.*, 2007).

Stage 2	Systolic 160 mm Hg or greater, diastolic 100 mm Hg or greater (Brixius *et al.*, 2007).
Systolic	The top number, which is also the higher of the two numbers, measures the pressure in the arteries when the heart beats (when the heart muscle contracts) (Kitzman *et al.*, 2001).
Young adult	A person aged between the ages of 18-35 years (Havard *et al.*, 2009).

ABSTRACT

Hypertension ranks third in the world, after underweight and unsafe sex, in the list of six major risk factors contributing to the global disease. It has shown to be a leading risk to cardiovascular disease and stroke. In Kenya, the prevalence stands at 24% in the general population, while among the young adults, the incidence of hypertension was reported to be in the rise; a fact attributed to increased number of mortalities arising from hypertension. The objective of this study was to determine the risk factors of hypertension among young adults aged 18-35 years attending Tenwek Mission Hospital. Study adopted hospital-based-control design with a sample size of n=160 young adults aged 18-35 years, involving 80 cases and 80 controls at Tenwek Mission Hospital, Bomet County, Kenya. Purposive sampling was used to select the cases whereas the controls were selected using simple random sampling after they had received their medication. Semi-structured interviewer administered patient questionnaire was used during data collection. Data collected were entered into MS excel then later transferred to STATA version 14.1 for cleaning and analysis. Level of awareness on knowledge about signs and symptoms was found to be below 36%. Awareness on how to reduce risk of hypertension was also found to be below 21% among the respondents. Multivariable logistic regression was fitted to find out factors associated with hypertension, where all covariates with p-value ≤ 0.1 were included in the adjusted model. All estimates and comparisons of the results were done at 5% level of significance. Descriptive statistics indicated that majority of the respondents were females {n=100 (62.5%)}. A half, that is 80 (50.0%) of the respondents were from the age group of 30-35 years. On the education level, 97 (60.6%) of the respondents were above secondary level. More than half, 113 (70.6%) of the respondents were married. Based on the occupation, 89 (55.6%) of the respondents were salaried. Most of the participants were earning Ksh 10,000 and below per month {n=70, (43.8%)}. Rural area was home for many respondents {n=111 (69.4%). One hundred (62.5%) respondents were found to be either overweight or obese. Self, mother and father reported the highest cases of hypertension at 31%, 26% and 24% respectively. In terms of signs and symptoms of hypertension, headache and dizziness were most reported with 36.0 % and 26 % of the respondent. Responses on reduction of salt intake were 21.0% and 20% for cases and controls respectively. On taking regular physical activity, they were 17.0% and 18% for control and cases respondents respectively. Multivariate logistic regression analysis found sex to be statistically significant risk factor of hypertension where females were found to be 2.5 times likely to suffer from hypertension compared to their males counterpart {AOR=2.5, 95%CI [0.48-5.69], p-value=0.034}. Participants aged 30-35 years were found to be 2.9 times likely to suffer from hypertension as compared with other age brackets of the study {AOR=2.9,95% CI [1.01-8.42], p-value=0.047}. Those participants who ate red meat once a week were found to be 5.2 times likely to suffer from hypertension as compared with those who didn't take the red meat {AOR=5.2, 95% CI [1.39-19.92], p-value=0.014}. Independent risk factors among young adults were; gender, age and red meat consumption. In order to control hypertension in young adults, preventive measures should be self-focus in this group in a manner to address variety of major risk factors in young adults. Government should make available provision on blood pressure check to members of public for

early tracking and tracing of young adults with hypertension to plan on a tailored intervention in prevention and control of hypertension.

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Hypertension also called high blood pressure, is a condition that arises when the body's smaller blood vessels (the arterioles) narrow, causing excessive pressure against the vessel walls forcing the heart to work harder to maintain the pressure (American Heart, 2017; Association, 2017). Hypertension is described as a systolic blood pressure (SBP) of 140 mm Hg or more, and/or a diastolic blood pressure (DBP) of 90 mm Hg or more (Bisognano, 2011; Ubolsakka-Jones *et al.*, 2014; Ubolsakka-Jones *et al.*, 2017).

In 1975 there were 594 million cases of hypertension globally. In 2015, 1.13 billion people were estimated to have hypertension, two-thirds of them living in low and middle-income countries. This rapid rise was detected in low- and middle-income countries. The rise was attributed with rise in the hypertension risk factors in related countries. Hypertension cases have been linked with both modifiable risk factors and non-modifiable risk factors. Modifiable risk factors include physical activity, alcohol intake, use of tobacco, unhealthy diet (low intake of fruits and vegetables, excessive salt consumption, diet highly saturated in fats and trans fats) and being overweight.

The situation in United States (U.S) is also worrying; having hypertension increases chances of having heart diseases and stroke, which are the leading causes of death in U.S. In 2018, almost half a million deaths in the U.S were attributed with hypertension as primary cause (CDC, 2018). Approximately half of the adults in the United States (108 million, or 45%) are taking medication for hypertension (C.D.C, 2019; CDC, 2019). Study conducted also in Southwestern China between 2013 and 2014 on prevalence awareness, control and prevention of hypertension among the adults, revealed that prevalence of hypertension was higher (40%) than global prevalence. Hypertension prevalence was also found to increase with age on both men and women (Huang *et al.*, 2019).

Hypertension is a silent, and progresses undetected causing later cardiovascular complications. It is also a major non- infective factor in the high mortality of adults in Sub-Saharan Africa (SSA) (Mohamed *et al.*, 2018). In SSA the burden of the hypertension is higher (27%) than prevalence of hypertension in America (18%). The high prevalence rate in SSA is attributed to low-and-middle-income of the Africa's countries (CDC, 2020). In the study conducted in Nigeria, on estimation of the prevalence of hypertension, nearly 20.8 million cases of hypertension were among people aged at least 20years with prevalence of 28.9% with prevalence of 29.5% among men and 25.0% among women. It is projected that by 2030 the cases of hypertension in Nigeria will surpass 39.1 million mark among people aging at least 20 years, with a prevalence of 30.8% (Adeloye *et al.*, 2015). In Ghana, the prevalence rate of hypertension is 27%. Adult's population in Ghana is estimated to be about 19.54 million in 2020, representing 62.9% of the total population. Approximately 5.27 million people have hypertension when 27% prevalence is applied to this figure. The prevalence was similar by sex and urban-rural setting (Bosu *et al.*, 2021). In South Africa, a study conducted on uncontrolled hypertension indicated high prevalence of 56.83% without any significant difference on sexes. These results were highly attributed to obesity, physical activity and dyslipidemia (Masilela *et al.*, 2020).

On the East Africa, the situation is not unique, study conducted in Uganda on people >=18 years of age, indicated that prevalence of hypertension was 31.5% and for pre-hypertension prevalence was 38.8%. Hypertension situation in Ugandan is really alarming and numerous people including young people are at higher risk (Lunyera *et al.*, 2018). In Tanzania, study done on epidemiology of hypertension in Northern Tanzania revealed that 59.3% prevalence among participants who >= 60 years of age, 30.9% prevalence among people between 40-59 years of age and 11.6% prevalence for those below 40 years of age. This is means that the hypertensive burden is substantial and optimal control is rare in Northern Tanzania (Galson *et al.*, 2017).

In Kenya, the prevalence stands at 24% in the general population (Tecla M Temu *et al.*, 2017; Tecla M. Temu *et al.*, 2018). Young adult aged 18-34 years comprises of

13.7million of the total population in Kenya (Gitogo, 2020). National Institute of Health (NIH) in a global multicenter study found out that there are 19 % young adults with hypertension. The study took blood pressure readings of 14,000 men and women aged between 24 and 32 years revealing a higher percentage of high blood pressure readings. These findings differ with those of National Health and Nutrition Examination Survey(NHNES) which reported only 4% prevalence of hypertension among adults aged between 20 and 39 years (Agrawal *et al.*, 2008; Nguyen *et al.*, 2011).

1.2 Statement of the problem

Hypertension is a major risk for cardiovascular disease and its magnitude has been increasing and associated with premature mortality. Global prevalence of hypertension stands at 31.1%. Cardiovascular diseases accounting for about 17 million deaths, with complications from poorly controlled hypertension. This resulted in over 7.5 million deaths and 57 million disability adjusted life years (DALYS). Eighty percent (80%) of deaths due to cardiovascular disease occur in low- and middle-income countries. In Africa, 40% of adults have hypertension. It is projected that one hundred and fifty (150) million people will suffer from the condition by 2025. In Kenya, about 24.5% of people aged 18-69 are affected with hypertension. Uncontrolled high blood pressure has been established to cause complication such as damage in arteries, heart, brain, kidneys, eyes and sexual dysfunction. Majority of the studies published have established that there is association between socio-demographic risk factors, lifestyle risk factors and environmental risk factors with hypertension. Levels of awareness on hypertension have been established to be very low among the public in general. However, these studies have concentrated on the general population and ageing population thus little information are known about young adults aged 18-35 years despite being over 70% of the workforce in Kenya. Data from Tenwek hospital showed that, there is an increase in number of young adults turning up with hypertension. Not addressing hypertension in young adults can have adverse significant impact on social and economic performance of the country. Therefore, this study was useful in addressing the risk factors of

hypertension among young people aged 18-35 years attending Tenwek Mission Hospital, Bomet County, Kenya.

1.3 Justification of the Study

In Kenya 75.1% of population are young adults aged below 35 years. Majority of this population reside in rural set-ups (Gitogo, 2020). Young adults dependency ratio is 75.8%, unemployment rate is 67% (Were, 2017). Study done in informal settlements (Korogocho and Viwandani slums) in Nairobi reported that 1 out of 10 young adult residents had hypertension(APHRC, 2013) (APHRC, 2013). In Subsequent study done by the same institution recently revealed an increase of hypertension cases in Kenya to 1 out of 4 adults (APHRC, 2019). Therefore, a higher disease burden in this age group will impact negatively on the country's resource utilization. Although overall rates of hypertension control have improved globally, young adults with hypertension are less likely to have their condition under control compared with aging population. Young adults are largely overlooked in studies since are deemed to be at a low risk of developing hypertension (Mills *et al.*, 2016). Studies have showed resultant gaps in the literature on hypertension among young adults aged 18-35 years (Reddy *et al.*, 2015). Therefore, there is need to improve young adult hypertension control. Specific interventions need to address bio-behavioral risk factors for hypertension in this population group (Black *et al.*, 2018). Prior studies have shown that young adults who meet established clinical criteria for hypertension are less likely diagnosed with the condition than middle-aged or older adults who meet the same criteria (Johnson *et al.*, 2014). These findings of this study will help government and other non-governmental organization in implementing policies that can help in prevention, treatment and management of hypertension among young people. These study results will also aid government in future planning that will ensure all the risk factors are allocated more resources for intervention. Study findings on awareness will enlighten the government on embarking on public campaigns on sensitization of the public on the predisposing risk factors of hypertension. This study was crucial in assessing both modifiable and non-modifiable risk factors of hypertension among young adults aged 18-35 years at

Tenwek Mission Hospital, in Bomet County, Kenya. The studies that consider risk factors among young adults are not rapidly available. Therefore, the findings of this study will be useful in providing additional information to already existing literature on the risk factors of hypertension among young adults aged 18-35 years attending Tenwek Mission Hospital.

1.4 Objectives:

Objectives were categorized into two that is, a general objective and specific objectives.

1.4.1 General Objective

To determine risk factors for hypertension among young adult patients aged 18-35 years at Tenwek Mission Hospital, in Bomet County, Kenya.

1.4.2 Specific objectives

1. To determine the socio-demographic and economic risk factors of hypertension in young adult patients aged 18-35 years at Tenwek Mission Hospital, in Bomet County, Kenya.
2. To establish the level of awareness of risk factors for hypertension among young adult patients 18-35 years at Tenwek Mission Hospital, in Bomet County, Kenya.
3. To assesses environmental risk factors of hypertension among young adult patients aged 18-35 years at Tenwek Mission Hospital, in Bomet County, Kenya.
4. To determine the life style risk factors of hypertension among young adult patients aged 18-35 years at Tenwek Mission Hospital, in Bomet County, Kenya

1.5 Research Questions

1. What is the socio-demographic and economic risk factors of hypertension in young adult patients aged 18-35 years at Tenwek Mission Hospital, in Bomet County, Kenya?

2. What is the level of awareness of risk factors for hypertension among young adults' patients aged 18-35 years at Tenwek Mission Hospital, in Bomet County, Kenya?
3. What are the environmental risk factors of hypertension among young adult patients aged 18-35 years at Tenwek Mission Hospital, in Bomet County, Kenya?
4. What are the life style risk factors of hypertension among young adult patients aged 18-35 years at Tenwek Mission Hospital, in Bomet County, Kenya?

1.6 Conceptual Framework

The conceptual framework operationalized variables in the study to investigate the risk factors of hypertension in young adults aged 18-35 year in Tenwek Mission Hospital, Bomet County, Kenya. The independent variables were socio-demographic factors, lifestyle factors, socio-environmental risk factors and level of awareness while the dependent variable was hypertension as show in the Figure 1.1 below.

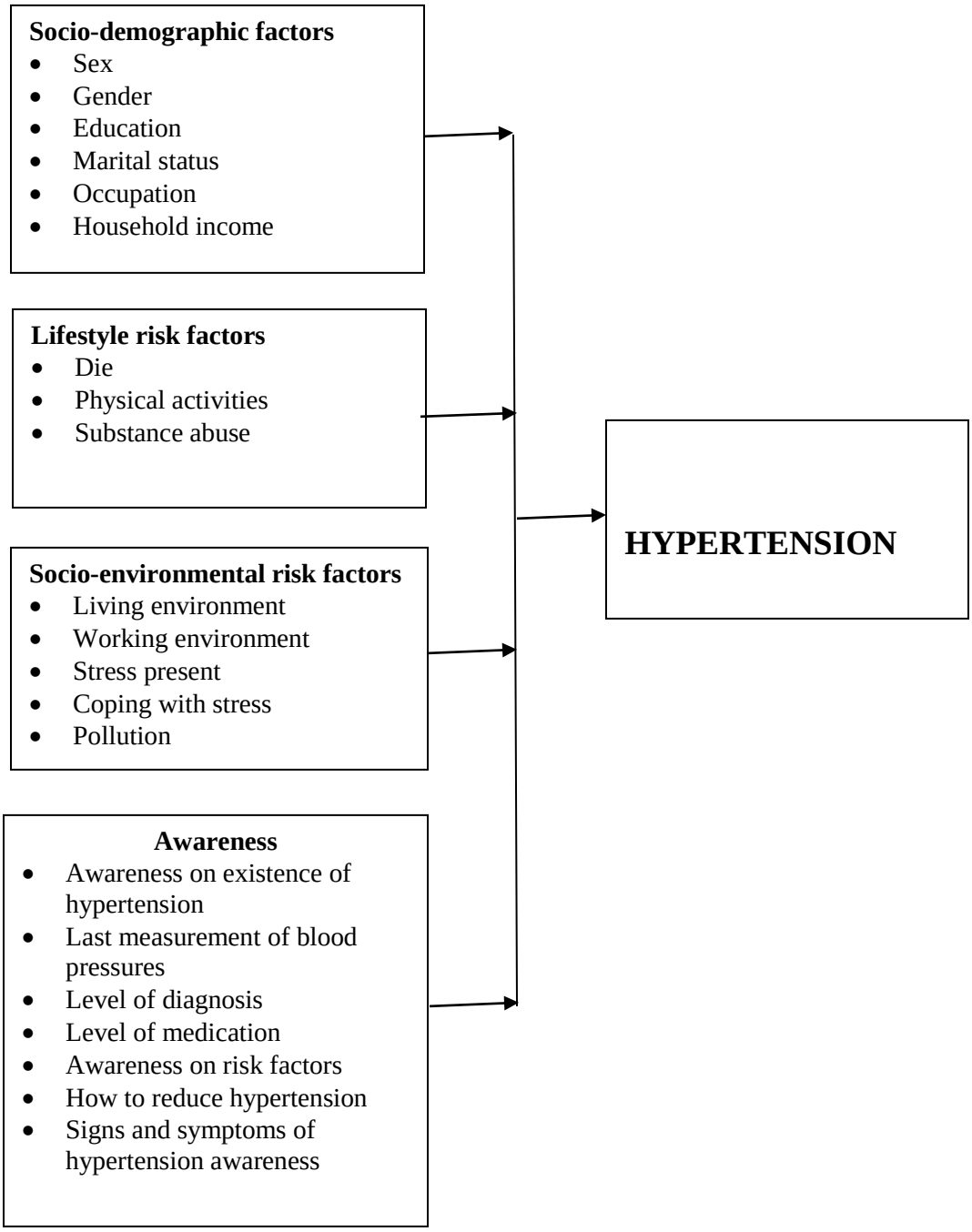


Figure 1.1: Conceptual Framework

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Hypertension or elevated blood pressure pose a serious medical challenge to the population and results in a rapid increase of risks of heart, brain, kidney and any other related diseases. Globally, 7.6 million deaths (13.5% of the total) reported annually are associated with high blood pressure. Elevated blood pressure has been attributed to 54% deaths of stroke and 47% deaths of coronary heart diseases (Arima *et al.,* 2011).The prevalence of hypertension in African stands at 27% which is worrying as compared to WHO region of the America with only 18% prevalence rate of hypertension . The high prevalence of hypertension in Africa has been attributed to low-and middle-income countries. However, the situation in Kenya is not appealing since the prevalence of prehypertension is 54.8%, while for hypertension is 20.8% (Mecha *et al.,* 2020). Detection of prehypertension emphasizes the need to embark on early treatment and benefits of life style modifications. The precaution measures are needed so that many later complications can be avoided (Srinivas *et al.*, 2013). .

2.1.1 Hypertension

Hypertension can be defined in two ways; first hypertension can be defined as high blood pressure at or above 130mm Hg in systolic and diastolic at or above 80 mm Hg. Second definition defines hypertension as blood pressure at or above 140 mm Hg in systolic and 90mm Hg in diastolic (CDC, 2020; WHO, 2021). World Health Organization guidelines were used in categorizing the blood pressure of the patients during data collection as the gold standard, as indicated in **Table 2.1.**

Table 2.1: WHO Classification of Hypertension

WHO CLASSIFICATION OF HYPERTENSION	SYSTOLE	DIASTOLE
Severe	>180	>110
Moderate	160-179	100-109
Mild	140-159	90-99
High	130-139	85-89
Normal	120-129	80-84
Optimal	<120	<80

2.1.2 Hypertension burden

Non-communicable diseases (NCDs) are estimated to cause 41 million deaths every year, equivalent to 71% of all deaths worldwide. The most affected age group is 30-69 years, where 15 million of them die from NCDs every year. Cardiovascular disease accounts for 17.9 million deaths, Cancer accounts for 9.3 million deaths, respiratory diseases accounting for 4.1 million deaths and diabetes 1.5 million deaths annually (WHO, 2021).

The proportion of the global burden of disease attributable to hypertension, increased from about 4.5 percent (nearly1 billion adults) in 2000 to 7 percent in 2010 (Bromfield *et al.*, 2013). This makes hypertension the single most important cause of morbidity and mortality globally and highlights the urgent need of action to address the problem. Eighty percent (80%) of global cardiovascular disease (CVD) mortality occurs in Low-and-Middle Income Countries (LMIC) (Adeloye *et al.*, 2015). Currently, hypertension is emerging as an important public health problem in sub-Saharan Africa (SSA) (Mills *et al.*, 2016); Approximately 80 million adults had hypertension in sub-Saharan Africa in 2000. Projections based on current epidemiological data suggest that this figure will rise

to one hundred and fifty (150) million by 2025 (Mills *et al.*, 2016). Risk factors for hypertension are increasing among African urban as well as rural populations (Mathenge *et al.*, 2010) .

In Kenya, 75.1% of the country's total populations are young adults aged below 35 years. There is wide disparity between the global percentages of youths (15.5%) and the Kenyan youth's percentage (75.1%). It is clear that young adults are the majority population in Kenya. Therefore, leading to higher competition for resources, opportunities, facilities and youth related services. Henceforth, health status of this population is very important since it has an impact on health economic status of the county. Geographical distribution differences shows, urban centers as the worst affected compared to rural settings (Van Vijver *et al.*, 2013). To achieve a meaningful reduction in morbidity and mortality, management of patients with existing hypertension coupled with treatment and prevention of major modifiable risk factors is important. World Health Organization indicate that, between 37 to 44 percent of the Kenyan adult population has hypertension (Hendriks *et al.*, 2012). Many countries in Africa, Kenya included, are undergoing a rapid demographic and epidemiologic transition. Attention in the region has been focused on communicable diseases such as malaria, tuberculosis, and HIV/AIDS. Changes in lifestyle associated with urbanization and emerging social stressors have resulted in an epidemiological and nutrition transition towards a greater prevalence of non-communicable diseases (Van Vijver *et al.*, 2013). In Bomet, Tenwek Mission Hospital a referral facility observed an increase turn up of young adults with hypertension. In a single month, 20% of those attended with hypertension, half of these were young adults with hypertension. However, there was no study done yet to validate these findings. Thus, this study was necessary so as to fill the gap of data on hypertension among the young adult aged 18-35 in Kenya.

2.2 Socio-demographic and economic risk factors of hypertension among young adults

In 2015, World Health Organization (WHO) established that 1 in 4 men and 1 in 5 women had hypertension. One in five people had their hypertension condition under control across the globe (WHO, 2021). Study conducted in United States (U.S), depicted that 1 in 4 adults (24%) had their hypertension condition under control, while about half (45%) of the U.S adults had their hypertension condition uncontrolled. A cross-sectional study conducted in Southern cone of Latin America, among 7,524 women and men aged 35- 75 years across the four cities, clearly indicated that men still bear the biggest burden of hypertension as compared to women. The findings indicated that 46.6% of men and 38.7% of women had hypertension, while 36.0% of men and 29.4% of women had prehypertension (Rubinstein *et al.*, 2016). Study conducted in urban settlement in Southern China among 11,517 people aged 35-79 years, indicated that the prevalence of hypertension is high in men than women (40% and 37.5% respectively). Prevalence of hypertension was found to increase with age in both women and men ($p<0.01$). Multiple factor analysis was conducted where age, male gender, family history hypertension and low educational achievement were all positively related with hypertension (Huang *et al.*, 2019).

In SSA, study conducted across 7 communities in East and West Africa countries with 3549 participants aged 18 years and above, found hypertension prevalence for women at 16.3% and 15.6% for men. Older age was associated with high blood pressure while primary education was associated with lower hypertension prevalence (Okello *et al.*, 2020). Study done on hypertension in 110 adolescents and young adults referred to a tertiary hypertension clinic in Cape Town South Africa, found that 61 (55.5%) were females, 22 (20%) Black African, and 88 (80%) of Mixed Ancestry. Eight (7.3%) were found to be normotensive, 16 (14.5%) had a secondary cause and 86 (78.2%) had essential hypertension. A family history of hypertension in a first-degree relative was present in 80 (72.7%) patients. Comorbidity present was obesity in 26 (23.6%), but 42.6% had a body mass index (BMI) $<25\,kg/m^2$ (Jones *et al.*, 2020)

A cross-section study conducted among college students (n=1596) in Tanzania and Uganda to determine the prevalence of elevated blood pressure (B.P) and its associated factors. The overall prevalence of B.P was 40%. The prevalence of pre-hypertension was 29% and 11% for hypertension. Males students aged above 20 years were found to be more hypertensive as compared with their females counterpart (Nsanya *et al.*, 2019). In Uganda, a national representative cross-sectional survey was conducted across 3416 participants across general population, prevalence of hypertension was found to be 31.5% among aged 18 years and above, while 38.8% was attributed to prehypertension. However, there was high prevalence of hypertension among adults age 21 to 40 years (42.8%) in all the regions that were under the study. However, there was no significant association on occupation, monthly income, and education attainment on prevalence of hypertension (Lunyera *et al.*, 2018).

Some trends have emerged, indicating that men are likely, than women to have hypertension (Long *et al.*, 2011). Ten percent of urban men are at risk of developing heart disease, within a period of 5–10 years. Young men are less likely than older men to believe they have hypertension . Level of education seemed to have an impact on prevalence of hypertension. Higher level of education was associated with lower incidence of hypertension (Van Vijver *et al.*, 2013). Marriage increased the risk of hypertension in women but not in men (Birditt *et al.*, 2014).

2.3 Level of awareness of risk factors for hypertension

In study conducted in United State of America (USA), Canada and England on the level of awareness, USA emerged with 80%, Canada 83% and England 65% level of awareness (Joffres *et al.*, 2013). Another study conducted in Latin America, concluded that approximately 63.3% adults with hypertension, 52,5% of men and 74.3% of women were aware of the disease condition (Rubinstein *et al.*, 2016). In China, a study conducted on prevalence, awareness, treatment and control of hypertension, sample of 11517 people were interviewed, aged 35-79 years between 2013 and 2014. Only 47.9% of the hypotensive patients were aware of the hypertension (Huang *et al.*, 2019). A

cross-sectional study conducted in Yazd, Iran on 10000 adults aged 20-69 years, reported only 49.7% of the people with elevated blood pressure were aware of their hypertension condition (Mirzaei *et al.*, 2020).

The level awareness in SSA differs from country to country as clearly depicted by the following studies done in Africa countries. In Nigeria, a cross-sectional study was done among the residents of the rural communities and secondary school students reported a higher awareness rate on hypertension ,75% among the participants (Omobuwa *et al.*, 2014; Amadi *et al.*, 2018). There was about 54% of the participants who were unaware of their hypertension condition in Botswana. These findings were concluded in a cross-sectional survey conducted in 2014 among 4070 people age 15-69 years (Tapela *et al.*, 2020).

Study conducted among 3145 participants in rural Tanzania on prevalence, awareness and control of hypertension among young and middle-aged adults reported only 34.3% level of awareness among the hypertension participants (Muhihi *et al.*, 2020).

A cross-sectional conducted in Kenya in 2015 among 4485 participants aged 18-69 years, found 15.6% of the participants were aware of their elevated blood pressure level (Mohamed *et al.*, 2018). A research on Assessment of hypertension control in a district of Mombasa Kenya, results indicated that hypertension awareness was associated with age and sex. Women were substantially more likely to be aware of and control their hypertension. Practical hypertension knowledge was associated with hypertension awareness and gender. Women had higher rates of knowledge than men (Jenson *et al.*, 2011). These results indicated that hypertension is a real public health concern in Old Town, and those younger individuals, particularly males, are less likely to be aware of the dangers of hypertension (Alexander *et al*, 2011).The level of awareness on hypertension in Kenya is very low as compared with other countries like Tanzania, Nigeria, Iran, China, U.S.A, England and Canada. This study is necessary to fill the data gap for people aged 18-35 years in Kenya.

2.4 Lifestyle and Environmental risk factors of hypertension

Several studies done have showed that environmental and lifestyle risk factors operate interactively rather than independently to promote hypertension among individuals in the society. There exist long term and short-term impact of numerous environmental factors reported to affect blood pressure, and they keep on changing such as exposure to loud noise, high altitude, cold ambient temperature, air pollution, specific organic pollutants and heavy metals. Other proposed environmental factors include obesity, alcohol, salt consumption, physical inactivity and exposure to chronic stress (Pickering, 2017).

Study conducted in Canada on 13,407 respondents indicated that engaging in less than 150 minutes per week on physical activities, eating less fruit and vegetables fewer than five times per day, being obese, having diabetes and having chronic disease were all associated with increased risk of elevated blood pressure. The reported prevalence of hypertension for those respondent with those six factors was 55% in women and 44% in men aged 20-39 years (Leung *et al.*, 2019).

Study conducted among 11,517 respondent aged 35-79 years in China on urban and rural respondents reported overweight, abnormal obesity and hypertriglyceridemia positively related to hypertension, while physical activity was negatively related to high blood pressure. The prevalence rate of hypertension among urban residents aged 35-79 was high (Huang *et al.*, 2019). Another study done in South Africa among 451 participants, from 2017 to 2019 reported nutritious foods, recreational physical activity and accessing of health care the risk factors to high blood pressure (Jongen *et al.*, 2019). Study done in India from 2015 to 2016 among 811,917 people aged 15-49 years, concluded that obesity and consumption of alcohol are the major predictors of hypertension (Ghosh *et al.*, 2019).

A study carried out in the South Africa in 2019 among 329 participants reported obesity, physical activity and dyslipidemia as a significant and independent determinants of uncontrolled hypertension (Masilela *et al.*, 2020). Adequate physical activity has many health-promoting effects and, independent role in reducing hypertension (Diaz *et al.*, 2013).

Genetics contributes to primary hypertension, persons whose parents had hypertension are more likely to be hypertensive themselves (Doris, 2011). Study done in University of North Carolina at Chapel Hill, found the association of drugs use with the rising incidences of hypertension (Viera *et al.*, 2010).

Young adults who use drugs that cause vasoconstriction, a narrowing of the blood vessels, often suffer from high blood pressure (Van Amsterdam *et al.*, 2012). Cocaine is the most common drug that causes high blood pressure. Some legal medications such as steroids, cold-relief medicines and birth control pills also can cause hypertension. This study, however, concentrated in specific population where drug use is prevalent among that age group (Han *et al.*, 2017).

Changes in individual and societal lifestyle is a risk to hypertension in young adults, such as an increase in tobacco use, excessive alcohol consumption, reduced physical activity and adoption of "Western" diets that are high in salt, refined sugar and unhealthy fats and oils (Teixeira *et al.*, 2016). There is a direct effect between high levels and specific patterns of alcohol consumption (such as binge drinking) and rising risk of hypertension (Van Vijver *et al.*, 2013). Fruit and vegetable consumption is one element of a healthy diet and varies considerably among countries, reflecting economic, cultural and agricultural production environments. Most of the benefits of fruits and vegetables come from reduction in CVD and risk factors, particularly hypertension (Alissa *et al.*, 2017). In addition to a high salt intake, many people in Africa often consume too much salt per day or twice the recommended maximum level. The core benefits of reducing salt intake correspond to reduction in high blood pressure (WHO, 2020). Reduction in salt intake and an increase in potassium improve the blood pressure in African

populations. A low sodium diet leading to a low urinary excretion level of 52 mmols per day, reduces blood pressure in normotensive people significantly within four to five days (Gersh *et al.*, 2010). Stress has been associated with hypertension. Severe stress can lead to a temporary but dramatic spike in blood pressure, over time this might contribute to high blood pressure, although not conclusively proved. In addition, some people cope with stress by overeating, drinking too much, or smoking, which may themselves be independent risk factors (Carroll, 2012).

Hypertensive disease is increasing in developing countries due to daily high alcohol consumption, frequent smoking, frequent red meat consumption and inadequate fruits and vegetables intake (Mundan *et al.*, 2013). Fruit and vegetable consumption is one element of a healthy diet and varies considerably among countries, reflecting economic, cultural and agricultural production environments. Most of the benefits of fruits and vegetables come from reduction in CVD and its risk factors, particularly hypertension (Kai *et al*, 2013). Findings from a cross-sectional study conducted in Kenya in 2015 among participants aged 18-69 years revealed higher body mass index and alcohol consumption as the risk factors of hypertension (Mohamed *et al.*, 2018). A study in Kenya reported that supplementation with potassium in newly diagnosed patients with hypertension, reduced the blood pressure to a level similar to that found in patients treated with a drugs (Van Vijver *et al.*, 2013).

2.5 Strategies and interventions for prevention and control hypertension

Within the context of limited resources, in most of Africa, the greatest gains in controlling the hypertension epidemic lie in its prevention, or at least early detection and adequate control (Beaglehole *et al.*, 2011). For most African communities the major obstacle to the control of blood pressure is the absence of appropriate services at the primary health care levels of the health service delivery system (Van Vijver *et al.*, 2013). The commonality of many risk factors for hypertension justifies an integrated approach to prevention and control hypertension. Levels of approaches are as follows; Primordial prevention- refers to reduction of the risk factors of hypertension in the general

population and decreasing the risk of developing hypertension in future. Primary prevention- refers to prevention of the condition in those who have prehypertension. Secondary prevention- refers to prevention of complications in those already developed hypertension. Tertiary Prevention- refers to preventing progression to end stage complications in those already developed some associated complication.

Several studies have suggested that medications now used to control blood pressure, such as angiotensin receptor blockers or angiotensin converting enzyme inhibitors, may also be helpful in the reduction of stress and anxiety (Marvar *et al.*, 2014). There are also a number of drugs that can treat high blood pressure, including beta-blockers, calcium channel blockers and angiotensin-converting enzyme inhibitors (Johannes, 2017). Thus, anti-hypertensive therapy should be tailored and personalized based on an individual's health profile (Turner *et al.*, 2007). For instance, in patients with hypertension associated with unusual features such as early onset of severe hypertension or clinical features such as palpitations and diaphoresis, further evaluation for secondary hypertension is recommended as these conditions are potentially curable. On the other hand, patients with severely elevated hypertension and with evidence of target organ dysfunction or damage need to be triaged early and started on antihypertensive therapy to lower cardiovascular and renal morbidity and mortality (Schmieder, 2010).

CHAPTER THREE

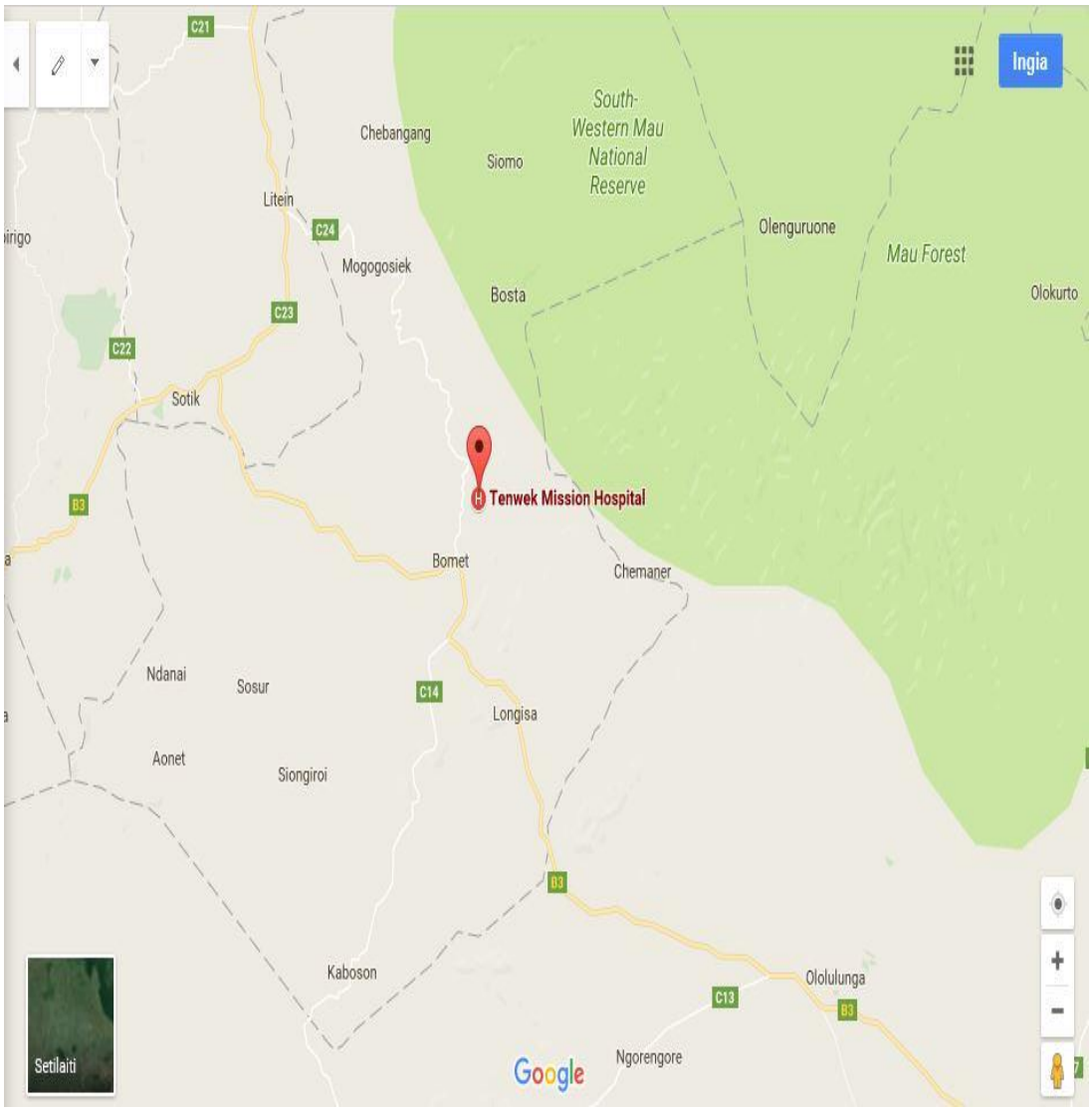
MATERIALS AND METHODS

3.1 Study Site

This study carried out in Tenwek Hospital, Bomet County. Bomet County lies between latitudes 0º 29’ and 1º 03′ south and between longitudes 35º 05′ and 35º 35′ east. Tenwek Mission Hospital is located approximately 200 miles southwest of Nairobi, Kenya. This highly respected Christian mission hospital offers primary healthcare to an area population of 800,000 and is a surgery center for a region of more than 8.5 million people.

Scale: 1:5,000,000

Figure 3.1: Map of Kenya Indicating Bomet County (Source: Google maps)



Scale: 1:500,000

Figure 3.2: Map of Bomet County Indicating Tenwek Mission Hospital, Kenya

(Source: Google maps)

3.2 Study Design

This study adopted hospital-based case-control design.

3.3 Study Variables

The outcome variable for this study was hypertension. The predictor variables for this study were; Socio demographic factors including; age, gender, level of income, residence and level of education. Lifestyle /Behavioral: physical activity, dietary habits, BMI, tobacco use and alcohol consumption.

3.4 Target Population

The study population comprised of cases of hypertension and controls as follows:

Cases-These were hypertensive young adults aged 18-35 years who were medically confirmed to have hypertension disease. **Controls**-These were young adults, aged 18-35 years identified in clinics and casualty triage in the same hospital with no disease of hypertension.

3.4.1 Inclusion Criteria

This study included:

- **Cases**- All young adults aged 18-35 years with hypertension already confirmed in the hospital records and visited the facility's non-communicable diseases department during the interview period.
- **Controls-** Young adults aged 18-35 years who consented to participate in the study with no history of hypertension who presented at the hospital with other diseases

3.4.2 Exclusion Criteria

This study excluded;

- Those who were critically ill during the study period.
- Those not willing to give consent.

3.5 Sample Size determination

With the proportion of those exposed in the control group being 24% from the literature (Tecla M Temu *et al.*, 2017). We sought to know the minimum sample size sufficient to detect an odds-ratio of 2.7 or greater. We assumed 80% statistical power, with equal number of cases and controls (r=1).We used formula for calculating sample size for case control studies (Demidenko, 2008).

$$n = \left(\frac{r+1}{r}\right)\frac{(\bar{p})(1-\bar{p})(Z_{\beta} + Z_{\alpha/2})^2}{(p_{cases\ exp} - p_{controls\ exp})^2}$$

- n=Sample size in Case group
- $\bar{P}$ Variability (standard deviation)
- For 80% power, Z_{β}=.84
- For 0.05 significance level, Z_{α}=1.96
- r=1 (equal number of cases and controls)
- The proportion exposed in the control group is 24%
- $P_{case\ exp}$-proportion of case exposed is 0.460 (as calculated below)
- $P_{controls\ exp}$ -proportion of control exposed is 0.24

To get proportion of cases exposed=

$$p_{case\exp} = \frac{ORp_{control\exp}}{p_{control\exp}(OR-1)+1}$$

Thus $P_{1=} \frac{2.7*0.24}{0.24*(2.7-1)+1} = 0.460$

Therefore, to get the average proportion exposed for the entire pool

$$\bar{P} = \frac{P_{controls\ exp} + P_{cases\ exp}}{2} = \frac{0.24 + 0.46}{2} = 0.35$$

$$n = \frac{2*(0.35)(1-0.35)*(0.84+1.96)^2}{(0.46-0.24)^2} = \frac{3.5672}{0.0484} = 73.7$$

3.6 Sampling Techniques

A purposive sampling was used in recruiting cases subjects. This was used under the strict condition to ensure all the patients recruited in the study met the set minimum inclusion and exclusion criteria. Simple random sampling was employed in selection of controls. Whereby, the patients visiting hospital were first allowed to receive their medication before they were subjected to eligibility checks. Patients walked into the clinic; their clinical records examined to assess their eligibility. The hypertensive young adults in the follow up sessions in the hospital records were also included. Phone calls were used to contact the ones in the hospital health records but did not make to the hospital during the interview period. Patients (cases) whom we contacted within data collection on 5th to 31st May 2018 met the minimum sample size. Controls were recruited from the outpatient clinics and casualty triage.

3.7. Pre-testing of data collection tool

A semi-structured questionnaire (Appendix 1) was pre-tested on 10% of sample size. This included eight respondents in cases and eight respondents in controls who met the inclusion and exclusion criteria at Tenwek Mission Hospital. The clinical records and the patient's booklet for the cases were examined to assess their eligibility. Patient's booklet for controls patients were examined also to ensure the eligibility of the patients to the pilot study. The questionnaires were then administered by trained research assistants and the participants were encouraged to make suggestions about the instructions, clarity of questions and relevance. The responses were used to improve the clarity, relevance and reliability of variables in the questionnaires. The pretest results were considered in improving the validity and reliability of questionnaires. Those patients interviewed during the pretest were excluded during the actual study.

3.8 Data Collection

The researcher and research assistant visited the health facility from Monday to Friday during data collection period that ran from 5th to 31st of May, 2018 to meet the patients for interviews. Cases and Controls were recruited simultaneously; cases were recruited based on the NCDs hospital records of diagnosis with hypertension while controls were based on outpatient department with patients without hypertension records. All the patients who visited the facility went through triage desk where blood pressure, weight and height were measured and recorded in the patient's booklet. Patients were allowed receive their medication before they were sampled for the interviews. Cases (n=80) were purposively sampled while controls (n=80) were recruited by simple random sampling. The questionnaires were then administered in private room by research assistants after explaining the purpose of study, confidentiality, data security and use of the data. Those who accepted to participate signed an informed consent (Appendix 4, 5, 6) and were also advised to consult for clarity when the need arose. Medical booklet carried by each respondent was checked to obtain the blood pressure readings and parameter for

calculating BMI. All the questionnaires completed by patients were thoroughly checked for completeness before patients were allowed to leave.

3.9 Data Management and Analysis

Data in all the questionnaires were entered in MS excel. Data cleaning, management and analysis was done using STATA version 14.1 (STATA Corporation, College Station, Texas, USA). Descriptive statistics for socio-demographic characteristics of the study population were analyzed using frequencies and proportions. Prior to analysis, some variables collected were collapsed and others combined. Pearson's Chi-square test of association was used to test for the association between the hypertension (dependent variable) and categorical variables (independent variables). Unconditional bivariate analysis was conducted across all independent variables against outcome variable (hypertension).

Multivariable logistic regression model was used to find out factors associated with hypertension, where all covariates with p-value ≤ 0.1 were included in the adjusted model. All estimates and comparisons of the results were done at 5% level of significance.

3.10 Ethical Considerations

Permission to carry out the study was obtained from Jomo Kenyatta University of Agriculture and Technology (JKUAT), Research Ethics Committee (appendix 2) and from the Ministry of Health. Further clearance for research sought from Tenwek Mission Hospital IREC (appendix 3). Informed consent from the respondents sought by adequately outlining to them the objectives of the study both written and through verbal communication. The respondents assured of confidentiality with all the information they would provide in the questionnaire. The questionnaires were administered in private room by research assistants after explaining the purpose of study, confidentiality, data security and use of the data. Those who consented to participate were subjected to sign

the informed consent (appendix 4, 5, 6 as English version, Kiswahili version and Kipsigis version respectively) and were also advised to consult for clarity when the need arise.

3.11 Minimization of Errors and Biases

- A pilot study done on 8 cases and 8 controls at Tenwek Mission Hospital to test the validity and reliability of the research instruments and to make any necessary adjustments to address challenges prior to conducting the actual study.
- Control's participants were sampled using simple random sampling to avoid selection biasness. This was done by approaching different outpatients randomly without knowing any detailed information on them and subjecting them to eligibility test (inclusion and exclusion criteria)
- Identifiable information was captured in separated form on the patients who consented to participated so as to avoid any future duplication of the response during the study period
- Questionnaires standardized to ensure uniformity: Questionnaires written in English translated to Swahili and Kipsigis for those who didn't understand English.
- The research assistants were trained on consenting process, data collection tools, safeguarding of confidentiality of the participants and objectives of the study to ensure uniformity during data collection process.

CHAPTER FOUR

RESULTS

4.1 Socio-demographic characteristics of young adult patients attending Tenwek Mission Hospital, Bomet County, Kenya (2018).

Table 4.1 shows, the socio-demographic characteristics of the study participants stratified by disease status. The results revealed that there were more female respondents with 55 (68.7%) cases as compare to 45 (56.2%) from the control group. A half of the respondents were in the age group of 30-35 years with 48 (60.0%) from cases group while 32 (40.0%) were from Controls group. Majority of the respondents were above secondary. No much difference observed among cases and controls since the proportions of respondents at tertiary levels were almost equal 48 (60.0%) and 49 (61.0%) respectively. Most of the respondent were married including 58 (72.5%) from cases and 55 (68.8%) from controls. Many of the respondents were earning KSh.10, 000 or less with no significant difference in the number of respondents in the control and cases group, 34 (42.5%) and 36 (45.0%) respectively. More than half of the respondents were staying in rural with 55 (68.8%) from control group and 56 (70.0%) were from the cases group. On body mass index, 42 (52.5%) of the respondent from cases were found to be overweight/obese, while 58 (72.5%) of the respondents from the control group were overweight /obese.

Table 4.1: Socio-demographic characteristic of the study population at Tenwek Mission Hospital, Bomet County, Kenya (2018)

Factors/Variables	Overall Total N (%)	Cases n (%)	Controls n (%)
Sex			
Male	60(37.5)	25(31.3)	35(43.8)
Female	100(62.5)	55(68.7)	45(56.2)
Total	160	80	80
Age group(years)			
18-23	29 (18.1)	10 (12.5)	19 (23.8)
24-29	51 (31.9)	22 (27.5)	29 (36.3)
30-35	80 (50.0)	48 (60.0)	32 (40.0)
Total	160	80	80
Highest level of education attained			
below secondary	36(22.5)	16 (20.0)	20 (25.0)
Secondary	27 (16.9)	16 (20.0)	11 (13.8)
Above secondary	97 (60.6)	48 (60.0)	49(61.2)
Total	160	80	80
Marital status			
Single	44 (27.5)	20 (25.0)	24 (30.0)
Married	113 (70.6)	58 (72.5)	55 (68.8)
Separated/divorced	3(1.9)	2(2.5)	1(1.2)
Total	160	80	80
Occupation			
Student	14 (8.8)	6 (7.4)	8 (10.0)
Farmer	40 (25.0)	19 (23.8)	21 (26.3)
Salaried	89 (55.6)	44 (55.0)	45 (56.3)
Unskilled	17 (10.6)	11 (13.8)	6 (7.4)
Total	160	80	80
Average monthly income			
non/<10000	70 (43.8)	36 (45.0)	34 (42.5)
11000-30000	46 (28.8)	24 (30.0)	22 (27.5)
31000-60000	44 (27.4)	20 (25.0)	24 (30.0)
Total	160	80	80
Area of residence			
Urban	23 (14.4)	12 (15.0)	11 (13.8)
Rural	111 (69.4)	56 (70.0)	55 (68.8)
Peri-urban	26 (16.2)	12 (15.0)	14 (17.4)
Total	160	80	80
BMI			
Normal	60(37.5)	38(47.5)	22(27.5)
Overweight/obesity	100(62.5)	42(52.5)	58(72.5)

4.2 Socio-demographic risk factors for hypertension among young adult patients attending Tenwek Mission Hospital, Bomet County, Kenya (2018).

From **Table 4.2**, χ^2 **test** showed age category was found to have association with hypertension, p=0.031. Body mass index (BMI) of the respondent also found to have association with hypertension with p=0.009.

Table 4.2: Socio-demographic risk factors for hypertension among young adult patients attending Tenwek Mission Hospital, Bomet County, Kenya (2018).

Factors/Variables	Overall Total N (%)	Cases n (%)	Controls n (%)	d.f	χ^2 p-value
Sex					
Male	60(37.5)	25(31.3)	35(43.8)	1	0.102
Female	100(62.5)	55(68.7)	45(56.2)		
Total	160	80	80		
Age group(years)					
18-23	29 (18.1)	10 (12.5)	19 (23.8)	2	0.031
24-29	51 (31.9)	22 (27.5)	29 (36.3)		
30-35	80 (50.0)	48 (60.0)	32 (40.0)		
Total	160	80	80		
Highest level of education attained					
below secondary	36(22.5)	16 (20.0)	20 (25.0)	2	0.501
Secondary	27 (16.9)	16 (20.0)	11 (13.8)		
Above secondary	97 (60.6)	48 (60.0)	49(61.2)		
Total	160	80	80		
Marital status					
Single	44 (27.5)	20 (25.0)	24 (30.0)	2	0.678
Married	113 (70.6)	58 (72.5)	55 (68.8)		
Separated/divorced	3(1.9)	2(2.5)	1(1.2)		
Total	160	80	80		
Occupation					
Student	14 (8.8)	6 (7.4)	8 (10.0)	3	0.600
Farmer	40 (25.0)	19 (23.8)	21 (26.3)		
Salaried	89 (55.6)	44 (55.0)	45 (56.3)		
Unskilled	17 (10.6)	11 (13.8)	6 (7.4)		
Total	160	80	80		
Average monthly income					
non/<10000	70 (43.8)	36 (45.0)	34 (42.5)	2	0.776
11000-30000	46 (28.8)	24 (30.0)	22 (27.5)		
31000-60000	44 (27.4)	20 (25.0)	24 (30.0)		
Total	160	80	80		
Area of residence					
Urban	23 (14.4)	12 (15.0)	11 (13.8)	2	0.902
Rural	111 (69.4)	56 (70.0)	55 (68.8)		
			14 (17.4)		
Peri-urban	26 (16.2)	12 (15.0)			
Total	160	80	80		
BMI					
Normal	60(37.5)	38(47.5)	22(27.5)	1	0.009
Overweight/obesity	100(62.5)	42(52.5)	58(72.5)		

4.3 Level of awareness on hypertension and its risk factors among young adult patients attending Tenwek Mission Hospital, Bomet County, Kenya (2018).

From **Table 4.3**, 80 (100%) of cases have heard about hypertension. Most of the cases {n=54 (67.5%)} reported to have their relatives suffering from hypertension. Respondents from cases group had their blood pressure measured, 80 (100%) with majority having blood pressure measured in less than one year 71 (88.8%). Cases were all aware of their condition of hypertension 80 (100%). Only 32 (40.0%) of the cases have been diagnosed in less than one year. Fifty-nine (73.7%) cases have been told to have hypertension more than 2 times. All the cases of hypertension were under medication 80 (100%), with 37 (46.3%) of the cases have been on the medication in less than one year ago. Majority of the cases have been advised to change their life style 49 (61.3%). Most of the cases accepted that smoking, physical activity, alcohol consumption, obesity are the risk factors for hypertension with 47 (58.8%), 50 (68.5%), 64 (80.0%) and 52 (65.0%) of the respondents respectively. Fifty-six (69.2%) of the cases accepted that hypertension is preventable.

Table 4.3: Level of awareness on hypertension among young adults' patients attending Tenwek Mission Hospital, Bomet County, Kenya (2018).

Heard of Hypertension	Control	Cases
Yes	59(73.8)	80(100.0)
No	21 (26.2)	0 (0.0)
Total	80	80
Relative Suffering Hypertension		
Yes	40 (50.0)	54 (67.5)
No	40 (50.0)	26 (32.5)
Total	80	80
Had Blood Pressure Measured		
Yes	55 (68.8)	80(100.0)
No	9 (11.2)	0 (0.0)
Not sure	16 (20.0)	0(0.0)
Total	80	80
Last Blood pressure measured		
<1 year	58(72.5)	71(88.8)
1-5 years ago,	22 (31.9)	9 (11.2)
Total	80	80
Told You Have Hypertension		
Yes	0(0.0)	80(100.0)
No	71(88.8)	0 (0.0)
Not sure	9 (11.2)	0(0.0)
Total	80	80
Diagnosed with Hypertension		
Less than 1 year	0(0.0)	32(40.0)
1 Year	0(0.0)	13(16.2)
2 Years	0 (0.0)	11 (13.8)
More than 2 years	0 (0.0)	24(30.0)
Never	80(100.0)	0(0.0)
Total	80	80
Told on 2 or more visits you have Hypertension		
Less than 2 times	0(0.0)	21(26.3)
More than 2 times	0(0.0)	59(73.7)
Never	80(100.0)	0(0.0)
Total	80	80
Currently on Medication		
Yes	0(0.0)	80(100.0)
No	72(90.0)	0(0.0)
Not sure	8(10.0)	0(0.0)
Total	80	80
How long on Medication		
< 1 Year	0(0.0)	37(46.3)
2 Years	0(0.0)	25(31.2)
3 years	0 (0.0)	4(5.0)
>3 Years	0(0.0)	14(17.5)
Total	0	80
Change Lifestyle		
Yes	11(13.7)	49(61.3)
No	58(72.5)	26(32.5)
Not sure	11 (13.8)	5(6.2)
Total	80	80

Risk Factor for Hypertension	Control	Cases
Smoking		
Yes	42(52.5)	47(58.8)
No	24 (30.0)	13 (16.2)
Don't Know	14 (17.2)	20 (25.0)
Total	80	80
Physical activity		
Yes	46 (57.5)	50 (62.5)
No	22 (27.5)	15 (18.8)
Don't Know	12 (15.0)	15(18.7)
Total	80	80
Alcohol Consumption		
Yes	51(63.7)	64(80.0)
No	29(36.3)	16(20.0)
Total	80	80
Obesity		
Yes	47(58.7)	52(65.0)
No	25(31.3)	14(17.5)
Don't Know	8(10.0)	14(17.5)
Total	80	80
Is hypertension preventable		
Yes	52(65.0)	56(70.0)
No	19(23.7)	15(18.7)
Don't Know	9(11.3)	9(11.3)
Total	80	80

4.3.1 Awareness about anyone with hypertension among young adult patients attending Tenwek Mission Hospital, Bomet County, Kenya (2018).

Majority of the case respondents either reported themselves, or very close relatives (blood relative) as the people whom they knew had hypertension, that is; mother, father or sibling, as for the control's counterparts a quite high proportion also reported having a blood relative i.e., father or mother with hypertension (**Figure 4.1).** Self, mother and father reported the highest cases of hypertension at 31%, 26% and 24% respectively.

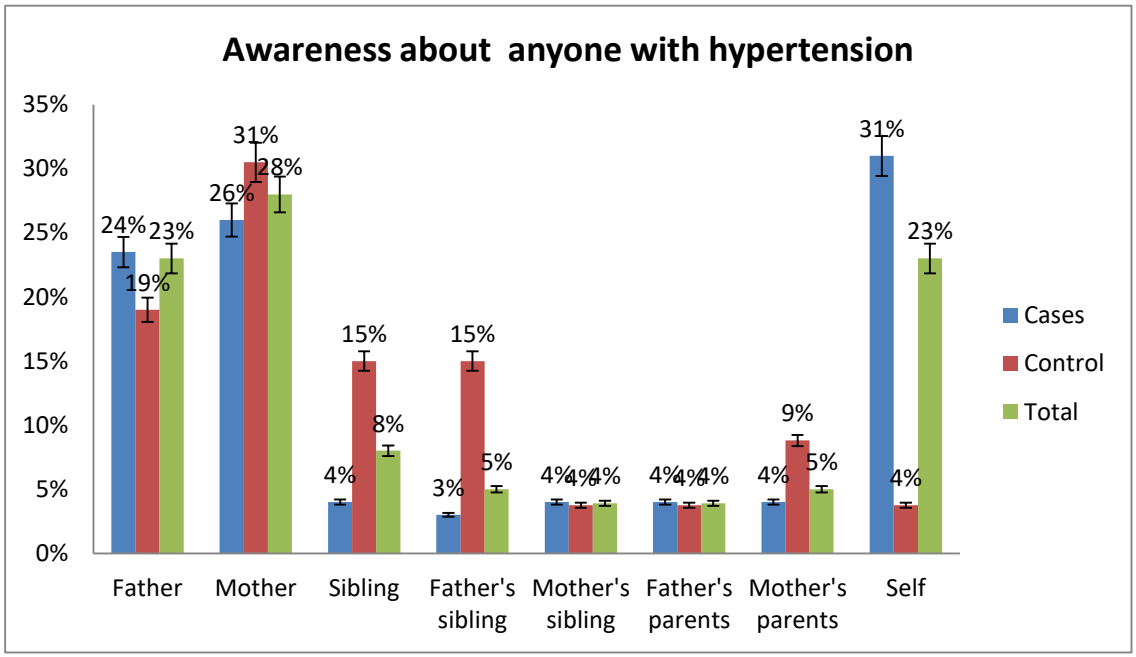


Figure 4.1: Awareness about anyone with hypertension among young adults' patients attending Tenwek Mission Hospital, Bomet County, Kenya (2018).

4.3.2 Level of awareness of Signs and Symptoms of hypertension among young adults' patients attending Tenwek Mission Hospital, Bomet County, Kenya

In terms of signs and symptoms of hypertension, headache and dizziness were most reported with 36.0 % and 26 % of the respondent while other signs and symptoms like Shortness of breath, chest pains, and palpitations were minor and they were reported by few respondents as indicated in **Figure 4.2.**

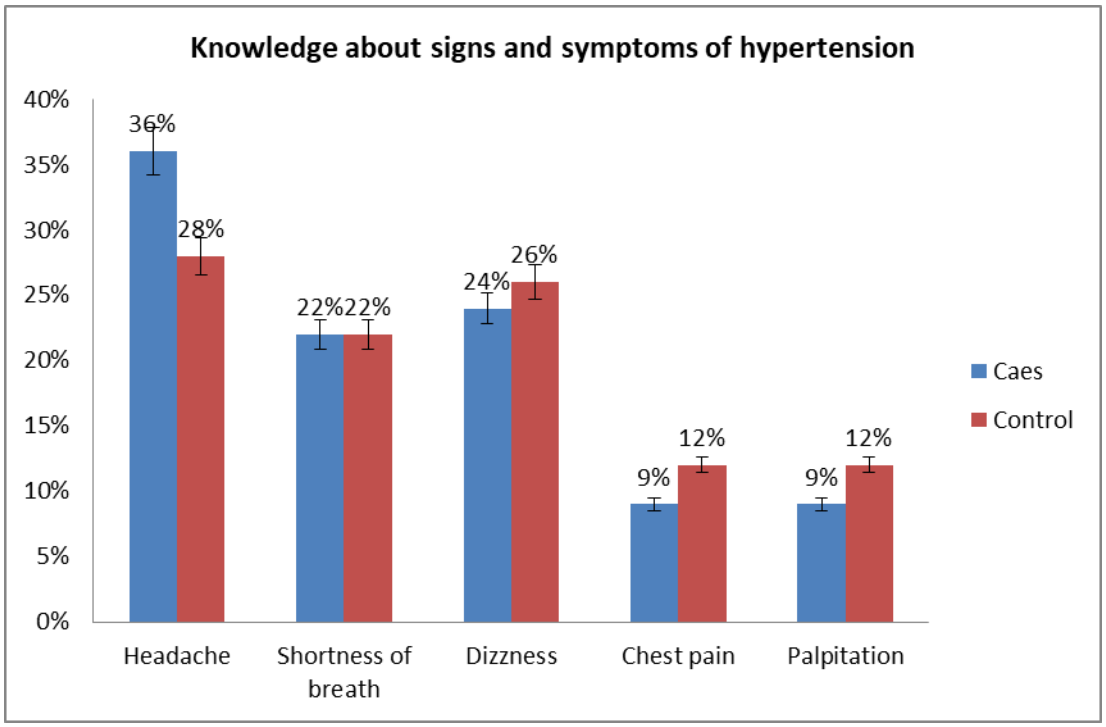


Figure 4.2: Signs and symptoms of hypertension among young adults' patients attending Tenwek Mission Hospital, Bomet County, Kenya (2018).

4.3.3 Awareness of methods of reducing hypertension among young adults' patients attending Tenwek Mission Hospital, Bomet County, Kenya

From the **Figure 4.3,** there was no much difference between cases and controls on ways to reduce hypertension. Responses on reduction of salt intake were 21.0% and 20% for cases and controls respectively. On taking regular physical activity, they were 17.0% and 18% for control and cases respondents respectively.

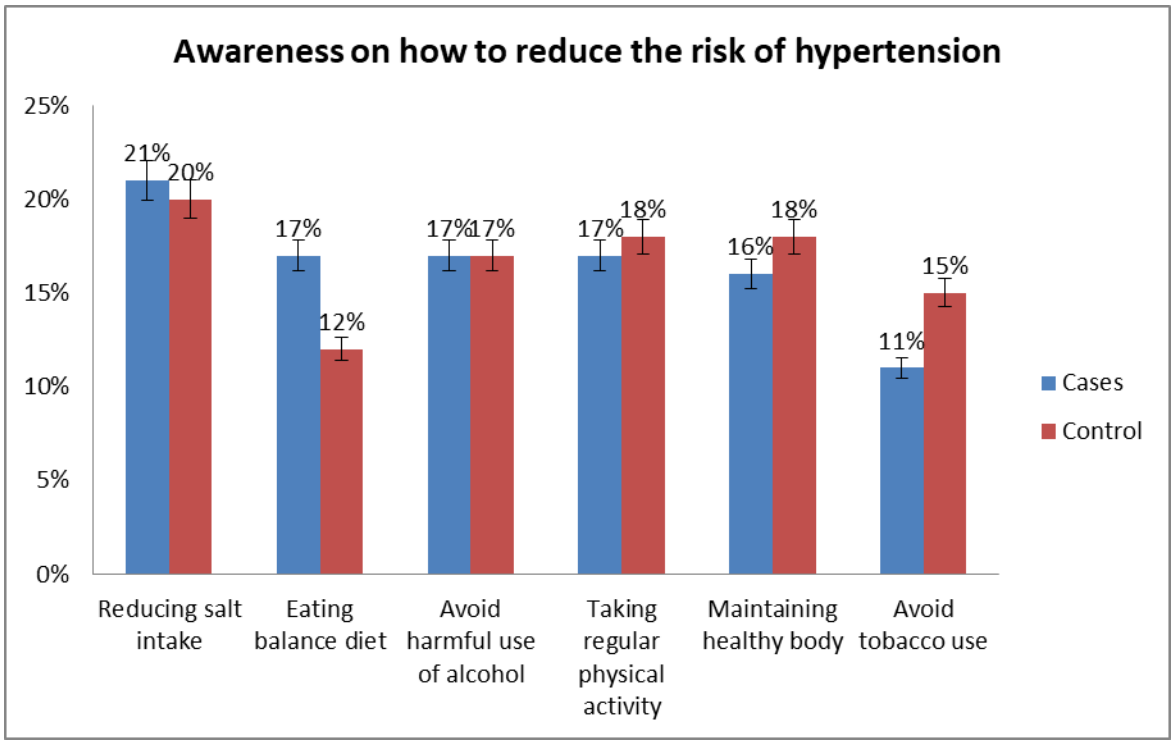


Figure 4.3: Awareness on how to reduce the risk of hypertension among young adults' patients attending Tenwek Mission Hospital, Bomet County, Kenya (2018).

4.4 Environmental risk factors of among young adult patients attending Tenwek Mission Hospital, Bomet County, Kenya (2018).

Results in the **Table 4.4** shows that 75 (47.8%) of the participants rated their work environment as good and of these 36 (46.8%) had reported cases of hypertension while 39 (48.8%) were in the control group. Rating of living environment, 84 (53.9%) of the participants rated their living environment as good and of these 45 (57.7%) had hypertension while 39 (50.0) were in control group. Those who have ever had stressful

situation in their lives were 45 (29.6%) of the participants and of these 23 (31.1%) had cases of hypertension reported while 22 (28.2%) were in the control group.

Coping up with the stress situation, 59 (48.4%) of the participants talked to their friends and of these 29 (47.5%) had reported cases of hypertension while 30 (49.2%) were in the control group. When it comes secondary smoking predisposition (neighbor smoking), 116 (73.4%) of the participants had their neighbor smoking and of these 61 (78.2%) had reported cases of hypertension while 55 (68.8%) of the respondents were in the control group. Participants who were living along highways and near factory were 57 (36.1%) and of these 28 (35.9%) of the participants had reported cases of hypertension while 29 (36.1%) were in the control group. However, results reveal that living environment is a risk factor for hypertension ($p=0.037$).

Table 4.4: Environmental risk factors of hypertension among young adults attending Tenwek Mission Hospital, Bomet County, Kenya (2018)

Environment Risk factors of Hypertension				
Variables/Risk Factors	**Overall N (%)**	**Control n (%)**	**Cases n (%)**	**χ^2P-value (d.f)**
How can you rate your work environment (missing=3)				
Bad	2(1.2)	2(2.5)	0(0.0)	0.467(4)
Poor	4(2.5)	3(3.7)	1(1.3)	
Fair	69(44.0)	32(40.0)	37(48.0)	
Good	75(47.8)	39(48.8)	36(46.8)	
Excellent	7(4.5)	4(5.0)	3(3.9)	
Total	157	80	77	
How can you rate your living environment (missing=4)				
Poor	3(1.9)	3(3.9)	0(0.0)	
Fair	64(41.0)	31(39.7)	33(42.3)	0.037(3)
Good	84(53.9)	39(50.0)	45(57.7)	
Excellent	5(3.2)	5(6.4)	0(0.0)	
Total	156	78	78	
Ever had stressful situation (missing=8)				
Yes	45(29.6)	22(28.2)	23(31.1)	0.698(1)
No	107(70.4)	56(71.8)	51(68.9)	
Total	152	76	74	
Where the stress arises from (missing=49)				
Domestic issues	29(26.1)	17(29.3)	12(22.6)	
Lack of adequate income	39(35.1)	16(27.6)	23(43.4)	
Work place conflicts	17(15.3)	10(17.2)	7(13.2)	
Ill health	15(13.5)	8(13.8)	7(13.2)	0.677(6)
Unemployment	8(7.2)	5(8.6)	3(5.7)	
Religion/customs	1(0.9)	1(1.7)	0(0.0)	
Others	2(1.8)	1(1.7)	1(1.9)	
Total	111	58	53	
How did you cope with the stress (missing=38)				
Talked to a friend	59(48.4)	30(49.2)	29(47.5)	
Sat and thought about it	35(28.7)	16(26.2)	19(31.2)	
Visited health facility	7(5.7)	3(4.9)	4(6.6)	0.875(5)
Prayed to God	17(13.9)	9(14.8)	8(13.1)	
Indulge in physical activity	3(2.5)	2(3.3)	1(1.6)	
Others	1(0.8)	1(1.6)	0(0.0)	
Total	122	61	61	
Neighbour smoke (missing=2)				
Yes	116(73.4)	55(68.8)	61(78.3)	0.179(1)
No	42(26.6)	25(31.2)	17(21.7)	
Total	158	80	78	
Living near to highway or Factory (missing=2)				
Yes	57(36.1)	29(36.3)	28(35.9)	0.963(1)
No	101(63.9)	51(63.8)	50(64.1)	
Total	158	80	78	

4.5 Lifestyle risk factors of hypertension among young adult patients attending Tenwek Mission Hospital, Bomet County, Kenya (2018)

Findings in the **Table 4.5** reveals that those who take red meat once per week were 54 (34.8%) of the participants and of these 20 (25.3%) were on control group and 34 (44.7%) were cases group. Consumption of processed meat, 56 (36.6%) of the participants eat processed meat once per week and of those 27 (35.5%) were in control group and 29 (37.7%) were from the cases group. Currently taking alcohol /smoking, 41 (26.0%) of the participants were taking alcohol/smoking and of these 16 (20.0%) were in control group while 25 (35%) were from the cases group. Alcohol consumption, minority of the respondents were taking alcohol, where 55 (35.3%) of the total population were taking alcohol. Among them 26 (32.9%) were from the control group while 29 (37.7%) were from the cases group. On drug intake, 6 (3.8%) participants were using bhang and all of them came from cases group. majority 92 (58.2) of the respondent eat fruit/vegetables once in a while if available where 48 (60.0%) were from the control group while 44 (56.4) were from the cases group. Addition of salt to served food, majority of the respondents 110 (70.1%) add salt once in a while, where 58 (72.4%) were from the control group and 52 were from the cases group. Most 83 (59.7%) of the participants, excised by walking once in a while, where 41 (56.9%) were from the control group and 42 (62.7%) were from the cases group. Majority, 64 (41.0%) of the respondent spent less than 30 minutes on walking, where 29 (36.3% were from the control group while 35 (46.1%) were from the cases group. However, consumption of the red meat ($p=0.007$) and drugs intake ($p=0.045$) by the participants were found to have a cause-effect on hypertension base on the chi-square test conducted.

Table 4.5: Lifestyle risk factors of hypertension among young adults attending Tenwek Mission Hospital, Bomet County, Kenya (2018)

How often you eat red meat	Overall N (%)	Control n (%)	Cases n (%)	Degree freedom (d.f)	χ^2p-value
Never	22(14.2)	16(20.3)	6(7.9)		
Once per week	54 (34.8)	20(25.3)	34(44.7)	2	0.007
1-2 times per week	42(27.1)	27(34.1)	15(19.7)		
More than two times	37(23.9)	16(20.3)	21(27.6)		
Total	155	79	76		
How often do you eat processed meat					
Never	84(54.9)	45(59.2)	39(50.7)		
Once per week	56(36.6)	27(35.5)	29(37.7)	2	0.419
1-2 times a week	12(7.8)	4(5.3)	8(10.4)		
More than 2 times a week	1(0.7)	0(0.0)	1(1.3)		
Total	153	76	77		
Currently Taking alcohol/ smoking					
Yes	41(26.0)	16(20.0)	25(32.0)	1	0.084
No	117(74.0)	64(80.0)	53(68.0)		
Total	158	80	78		
Alcohol consumption					
Yes	55(35.3)	26(32.9)	29(37.7)	1	0.535
No	101(64.7)	53(67.1)	48(62.3)		
Total	156	79	77		
Drug's intake					
Never	149(93.1)	76(95.0)	73(91.3)		
Bang	6(3.8)	0(0.0)	6(7.5)	3	0.045
Cocaine	4(2.50)	3(3.8)	1(1.2)		
Heroine	1(0.6)	1(1.2)	0(0.0)		
Total	160	80	80		
Consumption Fruit/vegetables					
Every day	64(40.5)	31(38.8)	33(42.3)	2	0.900
Once in a while if available	92(58.2)	48(60.0)	44(56.4)		
I don't take any fruits/vegetable	2(1.3)	1(1.2)	1(1.3)		
Total	158	80	78		
Addition of salt to food served					
Every meal	22(14.0)	11(13.8)	11(14.3)		
Once in awhile	110(70.1)	58(72.4)	52(67.5)	2	0.730
I don't add	25(15.9)	11(13.8)	14(18.2)		
Total	157	80	77		
How often do you exercise by walking					
Always	30(21.6)	20(27.8)	10(14.9)		
Once in awhile	83(59.7)	41(56.9)	42(62.7)	2	0.151
Never	26(18.7)	11(15.3)	15(22.4)		
Total	139	72	67		
Time spent on walking					
Less than 30 minutes	64(41.0)	29(36.3)	35(46.1)		
30-50 minutes	47(30.1)	27(33.7)	20(26.3)	2	0.427
More than 50 minutes	45(28.9)	24(30.0)	21(27.6)		
Total	156	80	76		

4.6 Bivariate and multivariate analysis of risk factors of hypertension among young adults' patients attending Tenwek Mission Hospital, Bomet County, Kenya (2018).

Table 4.6, shows that using multivariate logistic regression analysis, sex is statistically significant risk factor of hypertension where females were found to be 2.5 times likely to suffer from hypertension compared to their male's counterpart {AOR=2.5, 95%CI [1.48-5.69], p-value=0.034}. Participants aged 30-35 years were found to be 2.9 times likely to suffer from hypertension as compared with other age brackets of the study {AOR=2.9,95%CI [1.01-8.42], p-value=0.047}. Those participants who ate red meat once a week were found to be 5.2 times likely to suffer from hypertension as compared with those who didn't take the red meat {AOR=5.2, 95% CI [1.39-19.92], p-value=0.014}. In this study all socio-environmental factors assessed were found to be statistically insignificant risk factors of hypertension.

Table 4.6 Bivariate and multivariate logistic regression analysis of the risk factors associated with hypertension among young adult patients attending Tenwek Mission Hospital, Bomet County, Kenya (2018).

Risk factors	Overall N (%)	Control n (%)	Cases n (%)	COR (95%CI)	p-value	AOR (95%)	p-value
Sociodemographic risk factors for hypertension							
Sex							
Male	60(37.5)	25(31.3)	35(43.8)	Ref			
Female	100(62.5)	55(68.7)	45(56.2)	1.7(1.11-3.27)	0.014	2.5(1.48-5.69)	0.034
Age group(years)							
18-23	29 (18.1)	10 (12.5)	19 (23.8)	Ref			
24-29	51 (31.9)	22 (27.5)	29 (36.3)	1.4(0.56-3.7)	0.448		
30-35	80 (50.0)	48 (60.0)	32 (40.0)	2.9(1.17-6.92)	0.021	2.9(1.01-8.42)	0.047
Highest level of education attained							
below secondary	36(22.5)	16 (20.0)	20 (25.0)	Ref			
Secondary	27 (16.9)	16 (20.0)	11 (13.8)	1.8(0.66-5.00)	0.246		
Above secondary	97 (60.6)	48 (60.0)	49(61.2)	1.2(0.57-2.64)	0.605		
Marital status							
Single	44 (27.5)	20 (25.0)	24 (30.0)	ref			
Married	113 (70.6)	58 (72.5)	55 (68.8)	1.3(0.62-2.54)	0.509		
Separated/divorced	3(1.9)	2(2.5)	1(1.2)	2.4(0.20-28.45)	0.488		
Occupation							
Student	14 (8.8)	6 (7.4)	8 (10.0)	ref			
Farmer	40 (25.0)	19 (23.8)	21 (26.3)	1.2(0.35-4.11)	0.764		
Salaried	89 (55.6)	44 (55.0)	45 (56.3)	1.3(0.42-4.06)	0.648		
Unskilled	17 (10.6)	11 (13.8)	6 (7.4)	2.4(0.57-10.44)	0.228		
Average monthly income							
non/<=10000	70 (43.8)	36 (45.0)	34 (42.5)	1.3(0.60-2.71)	0.535		
10001-30000	46 (28.8)	24 (30.0)	22 (27.5)	1.3(0.57-3.00)	0.524		
Above 30001	44 (27.4)	20 (25.0)	24 (30.0)	ref			
Area of residence							
Urban	23 (14.4)	12 (15.0)	11 (13.8)	1.3(0.41-3.92)	0.674		
Rural	111 (69.4)	56 (70.0)	55 (68.8)	1.2(0.50-2.80)	0.693		
Peri-urban	26 (16.2)	12 (15.0)	(17.4)	ref			
BMI							
Normal	60(37.5)	38(47.5)	22(27.5)	ref			
Overweight/obese	100(62.5)	42(52.5)	58(72.5)	2.4(1.23-4.61)	0.010		
Environmental risk factors of hypertension							

Risk factors	Overall N (%)	Control n (%)	Cases n (%)	COR (95%CI)	p-value	AOR (95%)	p-value
How can you rate your work environment							
Bad	2(1.2)	2(2.5)	0(0.0)	NA			
Poor	4(2.5)	3(3.7)	1(1.3)	ref			
Fair	69(44.0)	32(40.0)	37(48.0)	3.5(0.34-35.02)	0.292		
Good	75(47.8)	39(48.8)	36(46.8)	2.8(0.28-27.84)	0.387		
Excellent	7(4.5)	4(5.0)	3(3.9)	2.2(0.15-33.93)	0.558		
How can you rate your living environment							
Poor	3(1.9)	3(3.9)	0(0.0)	NA			
Fair	64(41.0)	31(39.7)	33(42.3)	0.9(0.48-1.77)	0.808		
Good	84(53.9)	39(50.0)	45(57.7)	NA			
Excellent	5(3.2)	5(6.4)	0(0.0)	NA			
Ever had stressful situation							
Yes	45(29.6)	22(28.2)	23(31.1)	Ref			
No	107(70.4)	56(71.8)	51(68.9)	1.1(0.57-2.30)	0.698		
Where the stress arises from							
Domestic issues	29(26.1)	17(29.3)	12(22.6)	1.2(0.23-5.89)	0.843		
Lack of adequate income	39(35.1)	16(27.6)	23(43.4)	2.4(0.50-11.48)	0.275		
Work place conflicts	17(15.3)	10(17.2)	7(13.2)	1.2(0.21-6.56)	0.861		
Ill health	15(13.5)	8(13.8)	7(13.2)	1.5(0.25-8.4)	0.673		
Unemployment	8(7.2)	5(8.6)	3(5.7)	Ref			
Religion/customs	1(0.9)	1(1.7)	0(0.0)	NA			
Others	2(1.8)	1(1.7)	1(1.9)	1.7(0.07-8.4)	0.748		
How did you cope with the stress (missing=38)							
Talked to a friend	59(48.4)	30(49.2)	29(47.5)	1.9(0.17-22.50)	0.599		
Sat and thought about it	35(28.7)	16(26.2)	19(31.2)	2.4(0.20-28.67)	0.496		
Visited health facility	7(5.7)	3(4.9)	4(6.6)	2.7(0.16-45.14)	0.497		
Prayed to God	17(13.9)	9(14.8)	8(13.1)	1.8(0.13-23.52)	0.662		
Indulge in physical activity	3(2.5)	2(3.3)	1(1.6)	Ref			
Others	1(0.8)	1(1.6)	0(0.0)	NA			
Neighbour smoke (missing=2)							
Yes	116(73.4)	55(68.8)	61(78.3)	1.6(0.79-3.33)	0.180		
No	42(26.6)	25(31.2)	17(21.7)	Ref			
Living close to highway or Factory							
Yes	57(36.1)	29(36.3)	28(35.9)	ref			

Risk factors	Overall N (%)	Controln (%)	Cases n (%)	COR (95%CI)	p-value	AOR (95%)	p-value
No	101(63.9)	51(63.8)	50(64.1)	1.0(0.53-1.94)	0.963		
How often you eat red meat							
Never	22(14.2)	16(20.3)	6(7.9)	ref			
Once per week	54 (34.8)	20(25.3)	34(44.7)	4.5(1.53-13.47)	0.007	5.2(1.39-19.92)	0.014
1-2 times per week	42(27.1)	27(34.1)	15(19.7)	1.5(0.48-4.59)	0.496		
More than two times	37(23.9)	16(20.3)	21(27.6)	3.5(1.11-10.96)	0.031		
How often do you eat processed meat							
Never	84(54.9)	45(59.2)	39(50.7)	ref			
Once per week	56(36.6)	27(35.5)	29(37.7)	1.2(0.63-2.44)	0.535		
1-2 times a week	12(7.8)	4(5.3)	8(10.4)	2.3(0.65-8.25)	0.198		
More than 2 times a week	1(0.7)	0(0.0)	1(1.3)	NA			
Currently Taking alcohol/ smoking							
Yes	41(26.0)	16(20.0)	25(32.0)	1.9(0.91-3.89)	0.086		
No	117(74.0)	64(80.0)	53(68.0)	Ref			
Alcohol consumption							
Yes	55(35.3)	26(32.9)	29(37.7)	1.2(0.64-2.38)	0.535		
No	101(64.7)	53(67.1)	48(62.3)	Ref			
Drug intake							
Never	149(93.1)	76(95.0)	73(91.3)	ref			
Bang	6(3.8)	0(0.0)	6(7.5)	NA			
Cocaine	4(2.50)	3(3.8)	1(1.2)	0.3(0.04-3.41)	0.364		
Heroine consumption	1(0.6)	1(1.2)	0(0.0)	NA			
Fruit/vegetables							
Every day	64(40.5)	31(38.8)	33(42.3)	1.2(0.61-2.20)	0.646		
Once in a while if available	92(58.2)	48(60.0)	44(56.4)	Ref			
I don’t take any fruits/vegetables	2(1.3)	1(1.2)	1(1.3)	1.1(0.07-1.38)	0.951		
Addition of salt to food served							
Every meal	22(14.0)	11(13.8)	11(14.3)	ref			
Once in awhile	110(70.1)	58(72.4)	52(67.5)	1.1(0.44-2.79)	0.815		
I don’t add	25(15.9)	11(13.8)	14(18.2)	1.4(0.59-3.40)	0.432		
How often do you exercise by walking							
Always	30(21.6)	20(27.8)	10(14.9)	ref			
Once in awhile	83(59.7)	41(56.9)	42(62.7)	2.0(0.85-4.90)	0.107		
Never	26(18.7)	11(15.3)	15(22.4)	2.7(0.92-8.09)	0.070		
Time spent on walking							
Less than 30 minutes	64(41.0)	29(36.3)	35(46.1)	1.6(0.76-3.48)	0.208		
30-50 minutes	47(30.1)	27(33.7)	20(26.3)	Ref			
Mo re than 50 minutes	45(28.9)	24(30.0)	21(27.6)	1.2(0.52-2.69)	0.309		

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion

Based on the study findings, only age and sex from the Socio-demographic factors were found to be statistically significant risk factors of hypertension. Females were likely to suffer from hypertension compared with males. Respondents aged 30-35 years were likely to suffer from hypertension. Level of awareness was found to be very low based on knowledge of the signs and symptoms of hypertension and how to reduce the risk of hypertension. On lifestyle risk factors, consumption of red meat was found to be predisposing factor to hypertension among the respondents. There were no environmental risk factors associated with hypertension.

The study found that females were at a higher risk of having hypertension. This is in contrary to what other studies have found out about the prevalence of hypertension across both genders. A study done the United States (US), found out that that, young men in the US were more likely to suffer from hypertension as compared to women. This was largely attributed to lack of awareness and exposure to various risk factors (Everett *et al.*, 2015). Overall level of awareness of the disease amongst the genders, males were at a higher risk of suffering from hypertension as compared to women in Africa (Kayima *et al.*, 2013). Similarly, study conducted in Kenya, established that being male is a risk factor as men had a higher risk of suffering from hypertension as compared to women (Mohamed *et al.*, 2018).

Age was found to be a risk factor for hypertension. Respondent aged 30-35 years were at a higher risk of suffering from hypertension. As participants aged, it is expected that they would be more likely to be exposed to hypertension regardless of their gender. Age has always been a risk factor for hypertension with old people predominantly being more exposed as a result of various factors such as body weight and stress. The study

conform with study conducted in China that found out that as participants in their research grew older, they were more likely to suffer from hypertension (Liu *et al.*, 2016). Daugherty also found out that age played a bigger part in hypertension and its management .As one grew older, the risk of hypertension also increased, making its management also harder (Daugherty *et al.*, 2011). Study conducted in Kenya also found out that older people were likely to be at a higher risk of suffering from hypertension as compared with young people (Mohamed *et al.*, 2018).

General observation indicated that there is a high deficiency and knowledge gap in detecting the signs and symptoms of hypertension in young adults in the study area. Study presented low percentage of respondents on the understanding of the signs and symptoms. This finding is a clear indication that there is need for interventions that are more objective to understanding of signs and symptoms in both cases and controls. Study done in Nepal showed that most respondents were not aware on signs and symptoms and it emphasized on strategic formulation on creating awareness on signs and symptoms, complications and the management of hypertension (Kharel, 2017). Reduction of salt intake, avoiding harmful use of alcohol, taking regular physical exercise and maintaining proper diet responses are ideal ways to reduce hypertension. However, there were low proportions on the level of awareness in both cases and controls as reported in the study. However, studies done recommended lifestyle behaviors and practices such as diet and exercise are critical for hypertension prevention and treatment of hypertension (Wexler *et al.*, 2009), (D. W. Jones *et al.*, 2004). More tailored interventions are needed to emphasize on lifestyle modifications and behavior changes. Also, awareness and knowledge about hypertension needs to be enhanced and reinforced amongst the young adults.

The study findings also concur with other findings that states that despite of high prevalence of hypertension, the majority of the respondents were not aware of the disease (Ulasi *et al.*, 2011). In agreement to study findings, a research done in an institution in Nigeria revealing that there was low level of awareness of hypertension in the institution (Chinyere *et al.*, 2015). Similarly, Gómez-Olivé (2017) asserted that

within the hypertensive group although some participants were aware of the disease the level of awareness was still low (Gómez-Olivé *et al.*, 2017). In India, prevalence of hypertension was closely related to that of developed countries, a low level of awareness, treatment and control among Indian patients is a significant public health implications (Devi *et al.*, 2013). Another study recorded varied level of awareness between younger and older participants where older participants (female) with comorbidities being more likely to be aware compared with younger participants males and participants without comorbidities as well as patients with cardio metabolic being more unaware of hypertension. The results showed that there was low level of awareness of hypertension among the participants (Fenech *et al.*, 2020).

Avoiding consuming meat reduces the risk of developing hypertension meaning it had a protective effect. Frequency of eating red meat independently predicted hypertension. The risk of hypertension tends to increase with frequency of eating red meat. Those who reported eating red meat frequently had high likelihood of being hypertensive and were statically significant. The study was consistent with a study done in Kenya amongst the armed forces, that found the frequency of red meat consumption among hypertensive was higher compared to normotensive (Mundan *et al.*, 2013). Several dietary studies have also shown that increased red meat (beef, veal, pork) consumption corresponds to increased blood pressure. Red meat tends to be high in saturated fat which cause arteriosclerosis in blood vessels leading to high blood pressure (Wang *et al.*, 2008), (Tzoulaki *et al.*, 2008) and (Metintas *et al.*, 2009).This study finding indicated there a need on dietary guidance and health lifestyle living with more emphasis on fruits and vegetable intake. Our multivariable logistic regression found, having high blood pressure and frequently eating red meat, have a cause effect on hypertension. Drug's intake was associated risk factors of hypertension but not statistically significant in the study. This study conforms to a study of social habit, whereby, higher anthropometric parameters and diet rich in red meat and low in fruit was associated with hypertension among Kenya defense forces (Mundan *et al.*, 2013). Formulation of preventive measures geared to address the social lifestyle effect needs to be implemented.

Association between red meat and hypertension has been widely researched showing that consumption of red meat is associated with hypertension. The study found that eating unprocessed meat is a risk factor of hypertension. The study findings contradicts with other findings that revealed an association between consumption of processed red meat and having hypertension although, there was no association between unprocessed red meat and hypertension (Lajous *et al.,* 2014). The study that examined prospective cohort studies on the associations between red meat, poultry, or egg consumption with the risk of HTN, from the research the overall multi-variable adjusted RR showed a positive association between red meat consumption and the risk of hypertension. The analysis of both processed and unprocessed red meat was related with a higher risk of hypertension (Zhang *et al.,* 2018). The study findings were also in line with study that investigated the association of red meat intake in middle-aged and older women and found that red meat intake in middle-aged and older women was positively connected with the risk of hypertension (Wang *et al.,* 2008). This was also agreeing with Borgi whose findings supported that long term consumption of red meat was associated with hypertension risk (Borgi *et al.,* 2015).

Working environment was not statistically significant in this study. However, studies have shown that psychosocial work stressor, job strain and other work stressors, such as effort-reward imbalance, have been associated with high blood pressure. Quantity and quality of such psychosocial work stressors need to be investigated in order to ascertain and express on impact of psychosocial work stressors on BP and hypertension (Gilbert-Ouimet *et al.,* 2014). More studies needed to explore on work related risk factors to hypertension since there is paucity in such studies.

The study showed that respondents had faced stressful situations and overcame them through talking to a friend with minimal stating praying to God, indulging in physical activities and visiting a health facility. However, was not statistically significant. Stress and coping efficacy reported to independently affect the health of an individual. Past research, demonstrated higher levels of self-efficacy coupled with social support

facilitate healthier lifestyles and healthier coping behaviors are effective in coping with work-related stress (Khubchandani *et al.*, 2009) .

Higher percentages of both cases and controls reported exposed to secondary smoking (living with a person who smokes), though was not statistically significant. It is evident that secondary cigarette smoking has a profound adverse impact on health outcomes. Exposure to secondhand smoke has been associated with a disproportionately high risk of coronary heart disease. Mediated through inflammation, platelet aggregation, and/or endothelial dysfunction. However, epidemiological association between objectively measured exposure to secondhand smoke and biomarkers of heart disease risk not investigated. Intermittent exposure to second-hand smoke decreases blood flow hence high blood pressure (Terry, 2014). Policy makers' needs to put Tobacco Control Policies to protect the non-smokers from secondary smoking effect by providing well designated smoking zones for smokers.

Disturbing environments has been associated with rising in BP; this includes roadway traffic, airplanes, and occupational noises. However, in this study it was not significant. Studies demonstrates that living in locations that foster chronic exposure to loud noises (with the most evidence for roadways and airplanes) can increase the risk for overt hypertension (Barregard *et al.*, 2009) . Better understanding of hypertension in young adults needs to be beefed up. Emphasis on overall predisposition risk factors of hypertension should be enhance, both prevention and control to curb long-term morbidity and mortality.

5.2 Conclusions

There is unrecognized gradual increase of hypertension among young adults, suggesting epidemiological demographic shift of hypertension from old age to young age. Further, advancing age within the study population confers an independent risks factor for hypertension. There exist significant deficits in general knowledge and awareness about

hypertension in the young adult population. Red meat was independently and positively associated with hypertension in this this population.

5.3 Recommendations

More studies and directed efforts to young adults need to beef-up in addressing in prevention and control of hypertension.

There is need to design and implement community-based hypertension screening programs focused to young adults in both rural and urban residents in Bomet County. This will help in prevention and early detection of hypertension among young adults. Mass campaigns on awareness about hypertension on young adults need to be demonstrated and sensitized. Emphasis on good health behaviors and practices in this area needs demonstration and good guidance.

Based on the study outcome on socio environmental factors, more studies should be done so as to establish the real situation on the impacts of socio environmental factors on hypertension.

Young adults need to be empowered in health seeking behaviors and lifestyle modifications through health education through community mobilization, seminars and outreach services. This may work as a way to reach out for more youths at the community level and to boost their knowledge in prevention of hypertension. Formulate preventive measures in a manner to address variety of personal factors; i.e., life style tendencies, health-related aspects and practices.

5.4 Limitations of the Study

1) There was a risk social desirability bias because some respondents did not want to disclose some practices and behaviors that are socially unacceptable e.g., smoking and alcohol consumption leading under reporting of those risk factors as attest by research assistants.

2) Smoking and alcohol intake were not quantified in amount ascertain the amount that puts one at risk.

3) Co-morbid risk factors, e.g., HIV disease, kidney disease, diabetes etc., were not featured and interviewed though can have an influence on hypertension since the study was done strictly based on the objectives.

4) Recall bias rose in the study since only the cases were able to recall their past behaviors in both time and point which could have predisposed them to hypertension, while control was not able to recall on behavior encounters

5.5 Recommendation for further studies

More studies are encouraged in this age brackets (18-35 years) since they the backbone of the country's economy as well as they are deemed to be at low risk of hypertensions, of which is not true base on the study findings. Findings will help in formulating effective interventions directed to this age group.

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APPENDICES

Appendix I: Patient Exit Questionnaire

RISK FACTORS FOR HYPERTENSION AMONG YOUNG ADULTS PATIENTS AT TENWEK MISSION HOSPITAL, BOMET COUNTY.

Hospital number…….

Case: ☐
Control: ☐

SECTION 1. <u>INDIVIDUAL DEMOGRAPHICS</u>

1. a) Sex of the patient

1= Male ☐ 2= Female ☐

b) **Age in Years**: 1= 18-23 ☐ 2= 24-29 ☐ 3= 30-35 ☐

2. What is the highest level of education that you attained?

1= No formal education ☐ 2=primary incomplete ☐ 3=Primary complete ☐

4=secondary incomplete ☐ 5=above secondary ☐

3. Current marital status of the index:

1=Single ☐ 2= Married monogamy ☐ 3= Married polygamy ☐

3= Divorced ☐ 4=Separated ☐

4. Area of residence:

1=urban ☐ 2= rural ☐ 3= peri-urban ☐

5. Occupation

1=Student ☐ 2= Farmer ☐ = salaried ☐ 4 = skilled labor ☐

5= unskilled labor ☐ 6= Home maker ☐

6. What is your **AVERAGE** monthly income?

1= Below 10,000 ☐ 2=11,000 to 20,000 ☐ 3=21,000 to 30,000 ☐
4= 31,000 to 40,000 ☐ 5= 41,000 to 50,000 ☐ 6=51,000 to 60,000 ☐
7=Above 60,000 ☐ 8=None ☐

7. Measurements of height……

8. Measurement of weight……..

9. Body mass Index (BMI) ---------- Body Mass Index (BMI)
1=Less than 18.5 ☐ 2=18.5-24.9 ☐ 3=25.0-29.9 ☐
4=30.0-39.9 ☐ 5=≥ 40.0 ☐

10. Blood pressure (Gómez-Olivé *et al.*)
1. = Systolic lower than 120 mm Hg, diastolic lower than 80 mm Hg ☐
2. = Systolic 120-139 mm Hg, diastolic 80-89 mm Hg ☐
3. = Systolic 140-159 mm Hg, diastolic 90-99 mm Hg ☐
4. = Systolic 160 mm Hg or greater, diastolic 100 mm Hg or greater. ☐
5. = Don't know ☐

SECTION 2. KNOWLEDGE & AWARENESS

11. Have you ever heard of hypertension?
0=No ☐ 1=Yes ☐

12. If **YES** to the above question, do you have any close relative who is/was suffering from hypertension?

0=No ☐ 1=Yes ☐

13. If the answer is **YES**, who is this person?

1= Father ☐ 2=Mother ☐ = Sibling ☐ 4=Father's sibling ☐

5= Mother's sibling ☐ 6=Child ☐ 7= Father's parents ☐

8= Mother's parents ☐ 9=Sibling's child ☐ 10= Self ☐

14. Have you ever had your blood pressure measured?
0=No ☐ 1=Yes ☐ 3=Not sure ☐

15. If **YES**, when was your blood pressure last measured by a health professional?
1=Within the past 12 months ☐ 2= 1-5 years ago ☐
3=Not within the past 5 years ☐ 4=Never ☐

16. Have you ever been told by a doctor or other health worker that you have hypertension?
0=No ☐ 1=Yes ☐ 97=Not sure ☐

17. When were you diagnosed with high blood pressure?
1= Less than one year ago ☐ 2= One year ago ☐
3= Two years ago ☐ 4=Three years ago ☐
5=Four years ago ☐ 6=Five years ago ☐

7=More than five years ago ☐ 8=Never ☐

18. Were you told on 2 or more different visits that you had hypertension? Specify
1=Less than 2 times ☐ 2=More than 2 times ☐
3=Specify how many times ☐ 4=Never ☐

19. a) Are you currently taking medication prescribed by a doctor to lower your blood pressure? ☐ ☐ ☐
0=No 1=Yes 97=Not sure

b) If yes? For how long now
1=Less than One year ☐ 2=Two ☐
3=Three ☐ 4= More than three ☐

20. Has a doctor in the past year ordered you to change your way of life, in order to lower your blood pressure?
0=No ☐ 1= Yes ☐ 97= Not sure ☐

21. Is any of the following a risk factor for hypertension?

a) Smoking is a risk factor for hypertension.
0=No ☐ 1= Yes ☐ 2=Don't know ☐

b) Physical inactivity is a risk factor for hypertension.
0=No ☐ 1= Yes ☐ 2=Don't know ☐

c) Alcohol consumption is a risk factor for hypertension.
0= No ☐ 1=Yes ☐ 2 =Don't know ☐
d) Obesity is a risk factor for hypertension.
0=No ☐ 1=Yes ☐ 2=Don't know ☐

e) High blood pressure is a preventable condition.
0=No ☐ 1= Yes ☐ 2=Don't know ☐

22. The risk of developing high blood pressure can be reduced by: (choose all that apply)

1= Reducing salt intake ☐ 2=Eating a balanced diet ☐

3= Avoiding harmful use of alcohol ☐ 4= Taking regular physical activity ☐

5= Maintaining a healthy body weight ☐ 6=Avoiding tobacco use ☐

7=don't know ☐

23. What can be the signs and symptoms of high blood pressure? Choose all that apply.

1= No symptoms ☐ 2= Headache ☐ 3=Shortness of breath ☐
4=Dizziness ☐ 5=Chest pain ☐ 6=Palpitation ☐ 7=Don't know

SECTION 3. LIFE STYLE RISK FACTORS OF HYPERTENSION

☐

24. How often do you eat red meat?

1=Never ☐ 2= once per week 3=1-2 times per week ☐

4=3-4 times per week ☐ 5=5-6 times per week ☐

6=7 or more times per week ☐ 97=Others (Specify) ☐

25. How often do you eat processed meat products?

(***Processed meat includes, bacon, sausages, canned meat etc***.)

1=Never ☐ 2=Less than once per week ☐ 3=1-2 times per week ☐

4=3-4 times per week ☐ 5=5-6 times per week ☐

6=7 or more times per week ☐ 97=Others (specify)…….

24. Have you ever or currently taking alcohol or smoking

a) Smoking

0= No ☐ 1=Yes ☐

b). Alcohol consumption

0= No ☐ 1=Yes ☐

c). Have you in the recent past or currently used the following?

1=Bang, ☐ 2=Cocaine, ☐ 3=Heroine, ☐

4= others ☐ 5= (specify)……

25. How frequent would you describe your consumption of fruits/vegetables

1=Everyday ☐ 2=Once in a while if available ☐

3=I don't take any fruits or vegetables ☐ 4= others (specify)…….

26. How often do you have to add salt to food served to you on the table either at home or in a hotel?

1= every meal ☐ 2=Once in a while but not every meal ☐

3=I never add salt to served food ☐

27. How often do you exercise?

1=Always ☐ 2=Rarely ☐ 3=Never ☐

28. How many minutes do you spend walking on average per day?

1=Less than 30 minutes per day ☐ 2=30-50 minutes per day ☐

3=At least 50 minutes per day ☐

SECTION 4. SOCIO-ENVIRONMENT RISK FACTORS

29. How can you rate your working place working environment?

1=Bad ☐ 2=Poor ☐ 3=Fair ☐ 4=Good ☐ 5=Excellent ☐

30. How can you rate your living environments?

1=Bad ☐ 2=Poor ☐ 3=Fair ☐ 4=Good ☐ 5=Excellent ☐

31. Have you had any stressful situation in the recent past or currently?

0=No ☐ 1=Yes ☐

a) If **YES**, where did it arise from?

1=Domestic issues with spouse and children/relatives ☐ 2=Lack of adequate ☐ income

3=Work place conflicts/pressures ☐ 4=Ill health ☐

5=Unemployment ☐

6=Religion/customs ☐ 7=Other (Specify) ----------

b. How did you cope with the situation?

1=Talked to a friend ☐ 2=Sat and taught about it deeply ☐

3=Visited health facility ☐ 4=Pray to God to help get it over ☐

5=Indulge in some physical activity ☐ 6 = others (specify)……

32. Is there anyone in the neighborhood or at work who smokes cigarette frequently?

0=No ☐ 1=Yes ☐

33. Do you live near highway or near any factory?

0=No ☐ 1=Yes ☐

Appendix II: Research Ethics Committee

OFFICE OF THE DIRECTOR OF GRADUATE STUDIES AND RESEARCH

UNIVERSITY OF EASTERN AFRICA, BARATON

P. O. Box 2500-30100, Eldoret, Kenya, East Africa

November 13, 2017

Damaris O. Ondimu
Jomo Kenyatta University of Agriculture and Technology

Dear Damaris,

RE: ETHICS CLEARANCE FOR RESEARCH PROPOSAL (REC: UEAB/5/11/2017)

Your research proposal entitled ***"Risk factors for Hypertension among Young Adults attending in Tenwek Mission Hospital, Bomet County"*** was discussed by the Research Ethics Committee (REC) of the University and your request for ethics clearance was granted approval.

This approval is for one year effective November 13, 2017 until November 13, 2018. For any extension beyond this time period, you will need to apply to this committee one month prior to expiry date. Note that you will need a clearance from the study site before you start gathering your data.

We wish you success in your research.

Sincerely yours,

Prof. Jackie K. Obey
Chairperson, Research Ethics Committee

University of Eastern Africa, Baraton
13 NOV 2017
P. O. Box 2500-30100, ELDORET
Research Ethics Committee

A SEVENTH-DAY ADVENTIST INSTITUTION OF H IGHER LEARNING
CHARTERED 1991

Appendix III: Institutional Research and Ethics Committee (Venkateswarlu et al.) acceptance letter

TENWEK MISSION HOSPITAL

A ministry of Africa Gospel Church Postal Address

P.o. Box 39 Bomet -20400 Kenya

TCI:54)0728-091900,0735-580580/

020 -2045542.

Fax: 020-245416/5375

E-mail: tenwekQitenwek.eom

Website: VAvw.tenwekhospital.og

8 th May 2018

Dear Mrs. Damaris Ondimu,

Re: IREC approval for your research proposal

Regarding your research proposal titled:
"Risk factors for hypertension among young adults attending Tenwek Mission Hospital Bomet County"

Your proposal was reviewed by the Tenwek Hospital Institutional Research and Ethics Committee on 8 th of March 2018. You have satisfactorily addressed the IREC issues via your email correspondence of 4th May 2018, 16th April 2018, and March 1 5 th 2018.
We understand that Dr. Nassim Ngila will serve as your Tenwek Hospital facilitator.
The Tenwek Hospital IREC now approves your research proposal.

Kindly provide us with an update within one year and a full report of results when your study is completed.
Blessings on your study!
Sincerely,

TENWEK HOSPITAL

MEDICALSUPERINTENDENT

P.O Box 39 BOMET - 20400

Stephen L. Burgert, MD

Medical Superintendent

IREC Chair

RISK FACTORS FOR HYPERTENSION AMONG YOUNG ADULTS ATTENDING IN TENWEK MISSION HOSPITAL, BOMET COUNTY.

Appendix IV: Informed consent (English Version)

a) Consent form for participation in research (Zurovac *et al.*)

My name is Damaris O. Ondimu, a student at Jomo Kenyatta University of Science and Technology doing a study on hypertension for the purpose of completing my master's degree. This is a case-control study aiming at finding the risk factors of hypertension of people with hypertension and comparing them with the ages and sex of persons without hypertension. You will not include your name on the questionnaire and so there is no disclosure of information that specifies you. The data that will be collected will be analyzed and the results will be provided in tables and graphs. I will also publish the results and will also share the information with my school and also Tenwek Mission Hospital. I am targeting young adults between ages 18-35 years. All prevalent cases will be included (old and newly diagnosed) in the study. Before signing this form, kindly read through the points below that sign at the bottom of this form. If you have any questions concerning the study you may ask the research assistants after they have finished explaining to you.

Your Name.....

I being over the age of 18 years hereby consent to participate as requested in the research project titled above.

1. I have understood all the information provided.
2. I agree to the recording of my information and participation.

3. I understand that:

- I may not directly benefit from taking part in this research.
- I am free to withdraw from the project at any time and decline to answer particular questions.
- While the information gained in this study will be published as explained, I will not be identified, and individual information will remain confidential.

- Whether I participate or not, or withdraw after participating, will have no effect on any treatment or service that is being provided to me.
- Whether I participate or not, or withdraw after participating, will have no effect on my progress in my course of study, or results gained.
- I may ask that the interview be stopped at any time, and that I may withdraw at any time from the session or the research without disadvantage.

4. I agree to this information being made available to other researchers who are not members of this research team, but who are judged by the research team to be doing related research, on condition that my identity is not revealed.

Participant's signature……Date……...

I certify that I have explained the study to the volunteer and consider that she/he understands what is involved and freely consents to participation.

Researcher's name…….…….....

Researcher's signature……..Date…….

Appendix V: Informed Consent (Kiswahili Version)

VIKUNDO VYA KAZI KWA SHINIKIZO LA DAMU KATIKA WAKATI WA WANAWANA WANAOHUDHURIA KATIKA HOSPITALI YA TENWEK, KATA LA BOMET.

Jina langu ni Damaris O. Ondimu, mwanafunzi katika Chuo Kikuu cha Sayansi na Teknolojia ya Jomo Kenyatta nafanya utafiti juu ya shinikizo la damu kwa lengo la kukamilisha shahada ya uzamili. Hii ni utafiti wa kudhibiti kesi inayo lengo la kupata sababu za hatari za shinikizo la damu la watu wenye shinikizo la damu na kulinganisha na umri na jinsia ya watu bila shinikizo la damu. Hutajumuisha jina lako kwenye swali la maswali na kwa hiyo hakuna ufunuo wa habari unaokufafanua. Data ambayo itakusanywa itachambuliwa na matokeo yatatolewa kwenye meza na grafu. Mimi pia nitakuchapisha matokeo na pia nitashiriki habari na shuleni langu na pia Hospitali ya Tenwek Mission. Mimi niwalenga vijana wa umri kati ya umri wa miaka 18-35. Matukio yote yaliyoenea yatajumuishwa (ya zamani na ya kupatikana) katika utafiti.

Kabla ya kusaini fomu hii,kwa upendo wako soma kwa njia ya pointi chini hapo na kisha piga sahii chini ya fomu hii. Ikiwa una maswali yoyote kuhusu utafiti ,unaweza kuuliza wasaidizi wa utafiti baada ya kumaliza kuelezea kwako.

Jina lako .....

Mimi nikiwa zaidi ya umri wa miaka 18 nimekubali kushiriki kama nilivyoombwa katika mradi wa utafiti ulioitwa hapo juu.

1. Nimelewa habari zote zinazotolewa.

2. Nakubaliana na kurekodi habari na ushiriki wangu.

3. Ninaelewa kwamba:

- Siwezi kufaidika moja kwa moja na kushiriki katika utafiti huu.
- Nina huru kuondoka kwenye mradi wakati wowote na kushuka kujibu maswali fulani.
- Ingawa habari zilizopatikana katika utafiti huu zitachapishwa kama ilivyoelezwa, sitatambuliwa, na maelezo ya kibinafsi yataendelea kuwa ya siri.
- nitashiriki au sio, au kujiondoa baada ya kushiriki, haitakuwa na athari yoyote ya matibabu au huduma ambayo nilipatiwa.
- Iwapo nashiriki au sio, au kujiondoa baada ya kushiriki, haitakuwa na athari juu ya maendeleo yangu katika utafiti wangu, au matokeo yaliyopatikana.
- Ninaweza kuuliza kwamba mahojiano yaweze kusimamishwa wakati wowote, na kwamba niruhusu wakati wowote kutoka kwa kikao au utafiti bila ya kufadhaika.

4. Nakubali habari hii kuwa inapatikana kwa watafiti wengine ambao sio wanachama wa timu hii ya utafiti, lakini ni nani anayehukumiwa na timu ya utafiti kufanya utafiti unaohusiana, kwa hali ya kuwa utambulisho wangu haujafunuliwa.

Sahihi ya mshiriki ..... Tarehe ....

Ninahakikishia kwamba nimeelezea kujifunza kwa kujitolea na kuzingatia kwamba yeye anaelewa ni nini kinachohusika na hukubali kwa hiari kushiriki.

Jina la Mtafiti .....
Saini ya mtafiti ..... ……..Tarehe……

Appendix VI: Informed Consent (Kipsigis Version)

CHIGILISIET NE CHENGE TUGUK CHE TOS KOIB MYONDAB RUAETAT KOROTICH ENG BARNOTIK CHE BWONE SIBITALITAB TENWEK NOTON NEMITEN BOMET COUNTY.

Kainenyun ko Damaris O. Ondimu. Asomoni en sugulitab Jomo Kenyatta university of Science and Technology. Oyoe chigilisietab rwaetab korotik noton ne toreton onyor chomnchinet osir en somanenyun nebo barak. Chigilisioni kotokyingei konai tuguk chetos koib myondab rwaetab korotik. Ogerchindosi terutikab bik chetindo mnyoniton ak chemotindo myoniton kotyengei kenyisiek ak sigetab chiti(ngo Chepyos anan Muren). Ye kakopata chigilisioni owendi ogerchindosi wolutikab chigilisioni ak yeibata asir kartasi nengololen woluti choton. Nyoru kartasit noton sugul nenyun ak sipitalitab Tenwek. Motos onde kainangung anan ko kit agei tugul neiboru kole ingo en wolutik nyuk. Kartasitab teputik nyuk ko motinye ole kisirchin ki age tugul neiboru kole ingo so matuinywei iwolu tebutik. Ngot itinye tebutiet agei tugul imuchi iteb inguni.

Kotom inde seein kartasit ni, osome ole isoman ngalek chemi ngwony yu Korong asi ye kakobata inde seein nengunk.

Keinetab nekichigili……...

Ane kwobo kenyisiek chesire taman ak sisit agonu chomchinet atestai en chigilisietab rwaet ab korotik kotyengei tokyinetab gei nebo chigilisioni.

1. Koroguye ngalek tugul chekokemwowon kotyengei chigilisioniton.
2. Oyoni siretab ngalek tugul akobo ane kotyengei magetab chigilindet
3. Koroguye ole:
    - Motos obor anendet koyop chigilisioni.
    - Amuchi ostogei anan oesye owol tebutik alak tugul eng chigilisioni kotyengei amuneisyek chechuk ako malazima amwa amune.
    - Mogiboru kainet nenyun ye kagobata chigilisioniton eng olda tugul agot ndo kisir kartasit agei tugul ye kagobata chigilisiet.
    - Mowoloksei ole kinyoiton eng sibitalitab Tenwek kotyengein kayanetyun anan ko esyoenyun oik aenge eng chewolu tebutik eng chigilisioni.
    - Moimuchi kowal somanetab chiigilindet anan ko wolutikab chigilisioni esyoenyun komatgeboisienon en chigilisiet.
    - Omuchi alenji chigilindet kotonon eng chigilisiet eng sait ageitugul ago mowale ole kinyoiton.
4. Oyoni kogel walutikyuk bik alack cheyoe chigilisiet age tugul age kotyengei ole kogimwoundon kele mogiborto kainetnyun anan ko tuguk alack tugul che ibaru kole anei nekowolu tebutik.

Sain …… Torigit ……...

Ayoni ole korooru tuguk tugul chetinyegei ak chigilisioni ako amongu ole kakoguyo tuguk tugul ako kagoyan koik agenge eng chekiboisien eng chigilisioni.

Kainetab chigilindet ……. Sain …… Torigit ……...