PREVALENCE OF BEHAVIORAL RISK FACTORS FOR NON-COMMUNICABLE DISEASES AMONG POSTGRADUATE STUDENTS IN THE COLLEGE OF HEALTH SCIENCES AT THE UNIVERSITY OF NAIROBI.

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DEDICATION

To my family, friends and colleagues.

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ABSTRACT

Introduction

Non-communicable diseases are a major death globally. Kenya is faced by communicable diseases burden alongside a rapid increase in NCDs related morbidity and mortality. Health care workers are considered educators and role models in the area of health promoting behaviours yet studies report that risky health behaviours are prevalent in this population.

Objectives

This study assessed the behavioral risk factors of non-communicable diseases in postgraduate students of the College of Health Sciences at the University of Nairobi.

Materials and methods

The study population was postgraduate students of the College of Health Sciences at the University of Nairobi who are practicing health care workers. The sample size consisted of 329 randomly selected participants. A modified and pre-tested World Health Organization steps questionnaire was the data collection tool.

Results

Three hundred and three participants were recruited (174 men and 129 women). Majority were aged 26-30 years and were married. The prevalence of tobacco smoking was 6.3%, heavy episodic drinking was 1.19%, unhealthy diet was 92.1% and physical inactivity was 32%. Men were more likely to be users of tobacco and alcohol harmfully ($p=0.011$, $p=0.001$ respectively). More than 70% of the participants had no clear understanding of World Health Organization recommendations on use of tobacco, alcohol, healthy diet and

physical activity. There was low uptake of non-communicable disease screening services by the participants.

Conclusion

The postgraduate students who are practicing health care workers are exposed to behavioral risk factors for non-communicable diseases with unhealthy diet being the most prevalent factor. There was presence of tobacco use and harmful alcohol use in this population thus demonstrating a need to further investigate the factors contributing to this risk factor exposure. The postgraduate student's low level of knowledge on the published WHO guidelines and less than optimal health seeking behaviour calls for improvement in the training, capacity building and mentoring of health oriented postgraduate students both pre-service and in-service in the area of health promoting behaviours.

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LIST OF ABBREVIATIONS

BMI	Body Mass Index
CBD	Central Business District
CDC	Centers for Disease Control and Prevention
CHIVPR	Centre for HIV Prevention and Research
CHS	College of Health Sciences
CVD	Cardiovascular Disease
EU	European Union
FCTC	Framework Convention on Tobacco Control
GoK	Government of Kenya
HCWs	Health Care Workers
HDLc	High Density Lipoprotein cholesterol
KNH	Kenyatta National Hospital
LMIC	Low and Middle Income Country
MET	Metabolic Equivalent of Task
MoH	Ministry of Health
MS	Microsoft
NACADA	Campaign Against Drug Abuse Authority
NCDs	Non Communicable Diseases
NICE	National Institute for Health and Care Excellence
TTM	Transtheoritical Method
UK	United Kingdom
UNDP	United Nations Development Programme
UNITID	Institute of Tropical and Infectious Diseases
UoN	University of Nairobi

USA	United States of America
WHO	World Health Organization

DEFINITION OF OPERATIONAL TERMS

Harmful Alcohol Use

Drinking that causes ill health and negative consequences for the drinker and society, as well as the patterns of drinking associated with increased risk of negative health outcomes (WHO 2010). In this study harmful alcohol use refers to consumption of more than 6 standard alcoholic drinks in one occasion (Heavy Episodic Drinking).

Obesity

The state of excessive fat accumulation that is a risk to health. Traditionally defined as having a body mass index of 30 and above (WHO 2014a). Body mass index is a measure that relates body weight to height in adults, where a person's weight in kilograms (kg) is divided by their squared height in meters (WHO 2014a).

Physical Inactivity

This refers to fewer than 2.5 hours of moderate-intensity physical activity, 1.25 hours of vigorous-intensity physical activity or an equivalent sum of moderate and vigorous-intensity physical activity that attains a minimum of 600 metabolic equivalent of task (MET) - minutes throughout a week (WHO 2013b). Moderate activity accounts for 4 MET and vigorous activity account for 8 MET (WHO 2015e). In this study, a participant's MET-minutes per week were estimated as the sum of self-reported MET-minutes for walking or cycling, vigorous intensity activity work+sport and moderate

intensity work+sport throughout the week. Inadequate physical activity was defined as an individual achieving fewer than 600 MET-minutes in a week.

Risk Factor

A characteristic that increases a person's chances of developing a disease or injury (WHO 2015c). In this study, these factors refer to tobacco use, harmful alcohol use, unhealthy diet and physical inactivity as behavioral risk factors.

Screening

Screening is the presumptive identification of undetected disease or defects by means of tests, examinations, or other methods that can be carried out in a short period of time (WHO 2015d). In this study this refers to assessment for elevated blood pressure, blood sugar, blood cholesterol and cervical cancer.

Tobacco Use

This is the routine use of the tobacco plant leaf and its products (Al-Ibrahim & Gross 1990).

Unhealthy Diet

This is a diet that does not deliver to your body with the required amounts and variety of nutrients for optimal health (Reed 2011). In this study such diets refer to those that constitute intake of inadequate fruits and vegetables (fewer than 5 combined servings in a day), predominant simple carbohydrates, predominant red and/or organ meats as well as use of unhealthy oils and fats in household cooking. Healthy oils are those with few hydrogen atoms bonded to their carbon chains. Examples include olive oil, sunflower oil and corn oil. Unhealthy oils are those whose carbon chains are saturated with hydrogen atoms. They are solid at room temperature and examples include hydrogenated vegetable oils, coconut oil and animal fat found in red meats and whole milk dairy products (Harvard Medical School 2015).

CHAPTER 1: INTRODUCTION

1.1 Background

Non-communicable diseases (NCDs) according to World Health Organization (WHO) have been defined as long standing diseases which are not passable from one person to another. NCDs are considered an emerging epidemic. They are responsible for approximately 60% of deaths recorded that occurred globally in 2008 (WHO 2014d). In Africa, deaths from infectious diseases surpassed NCDs but WHO notes that NCDs prevalence is rising rapidly and they project that by 2030, NCDs deaths will be the leading cause of mortality (WHO 2011b). The four conditions that have been identified and grouped as NCDs by WHO are diabetes, cardiovascular diseases, chronic respiratory diseases and cancers due to their high burden and common risk factors (WHO 2013c).

World health is experiencing a shift. The world population is aging alongside progressive economic development. Developing countries are bearing the brunt of the NCD scourge. Presently, NCDs affect low and middle-income countries (LMIC) more (WHO 2011a) where approximately four fifths of the 2008 NCDs deaths occurred in LMIC with 30% of these deaths occurring in adults aged less than 60 years whereas in developed countries 13% of the NCDs deaths occurred in adults less than 60 years (WHO 2011b). Projections published in 2007 on the burden of NCDs on LMIC reported that mortality attributed to NCDs as a percentage of total deaths in the 23 developing countries studied would be 61% in 2005, 66% in 2015 and 71% in 2030 (Abegunde et al. 2007). Majority of African countries (47 out of 54) are considered to be developing countries (World Bank 2014).

There is no age or regional disparity with NCDs burden. The majority of the developing world population are at risk of NCDs because of population ageing and the adverse effects of globalization such as unplanned urbanization, unfair trade, irresponsible marketing and increasingly sedentary lives (WHO 2011b). Africa is plagued by a lingering infectious diseases burden and an emerging NCDs epidemic. Globalization, nutrition transition, attractive marketing strategies and adoption of energy saving technologies have been closely associated with increase in NCDs especially in developing countries.

Globalization in Africa has been associated with a rise in tobacco and alcohol use as well as nutrition transition to a calorie rich diet combined with low levels of physical activity especially in urban areas; and this is reflected in the high incidence of urban obesity (Popkin BM 2003 cited in Beaglehole & Yach 2003). The policies of globalization instrumental in encouraging the free flow of unhealthy foods and commodities between regions (Grover 2014). According to Beaglehole and Yach (2003), there is direct and indirect contribution to NCDs epidemic by globalization. Indirect contribution is in form the organiation of global trade by World Trade Organization where the rules and regulations shape national economic performance which in turn determines average household income and government expenditure on areas such as health and education. The greatest impact of this is experienced in low income economies. Direct contribution is in form of increased globalized production and trading of unhealthy goods such as tobacco and alcohol; salty, sugary, and fatty foods to most parts of many countries.

Developing countries such as those in Africa, the nutrition transition is said to be taking place rapidly and is associated with increased occurrence of NCDs. This is because diets rich in complex carbohydrates and fiber have given way to diets with a higher proportion

of saturated fats and simple sugars (Popkin 1994 cited in Drewnowski & Popkin 1997). This is worsened by sedentary lifestyles, increased alcohol consumption and cigarette smoking within increasingly urban environmemts (WHO 2003 cited in Vorster et al. 2011).

Raske and Cheema attribute East Africa's nutrition transition to the implementation of colonial and neo-colonial attributes that resulted in the development of the globalized food system. This is based on the creation of structures which oversee the production and trade of food (Lang 1999 cited in Raschke & Cheema 2008). They resonate with Popkin (2004) that traditional African foods which included a broad range of indigenous food sources rich in fiber and nutrients were replaced by refined flour and sugars, vegetable fats and food additives (Raschke & Cheema 2008) with a resultant upsurge in NCDs (WHO 2003 cited in Raschke & Cheema 2008).

Moodie and colleagues identify trans-national corporations as major drivers of NCDs epidemic through their marketing and trade in of tobacco, alcohol, and unhealthy ultra-processed edibles (Moodie et al. 2013). Food, tobacco and alcohol producing companies market attractive yet unhealthy products that are misrepresented in their labels. Despite containing excessive quantities of sodium, sugar and trans-fats, junk-food companies have found their way into the society including schools and hospitals (Gostin 2014). For instance, marketing strategies are used to increase uptake of unhealthy commodities by ensuring they are sold at affordable prices and no stock outs are experienced.

In some rural areas for instance, soft drink companies have invested in smaller packaging sold at lower prices to enhance acceptability of the product (Popkin et al. 2012 cited in Grover 2014). The United Nations Development Programme (UNDP) recommended actions towards controlling NCDs and their social determinants. Among the actions proposed is regulation of marketing and sale of unhealthy commodities through specific laws, policies and programmes implemented by government such as the WHO tobacco control campaign where governments that have adopted the FCTC report reduced tobacco use in the population (UNDP 2013).

Dr. Fitzroy Henry attributed the growing obesity trend in the Caribbean to the uptake of western food systems, labor saving technologies and a consumer culture into societies which resulted in obesogenic environment (Henry 2007). Energy saving technologies cause a reduction in body energy spent (WHO 2015a).

The combination of these energy-sparing technologies together with the attractive advertisements has led to the consumption of unhealthy foods and sedentary lifestyles (Mattson 2012). The society-wide decline in individual energy expenditure accelerates the rise in obesity and eventually an increase in burden of NCDs (Harvard School of Public Health 2015).

There's paucity of published data on the burden of NCDs in developing countries. The true picture of NCDs burden in Kenya has not been published due to the absence of objective data. Disease burden publications by the GoK focus primarily on communicable diseases and do not report on NCDs as a standalone category as demonstrated in the

Demographic and Health Survey 2014 which focuses on maternal health, child health and selected communicable diseases (Kenya National Bureau of Statistics 2015). There is no nationally representative data on the burden of NCDs in Kenya but literature estimates report that NCDs contributed to over 33% of all mortalities in Kenya in 2007 (Maina W K, 2011) whereas the Kenya Health Policy 2012-2030 estimates that NCDs accounted for more than half of all inpatient cases and up to half of all inpatient mortality during the policy period 1994-2010 (Government of Kenya 2012).

Like the general population, health care workers (HCWs) are afflicted by diseases both of communicable and non-communicable nature. Health care workers are considered role models in the area of health promoting behaviors. Many individuals cite their health care giver as their main source of advice regarding health practices. Individuals are more likely to practice healthy behaviour when their health provider recommends it (Abramson et al 2000 cited in Oberg & Frank, 2009). Studies have demonstrated that the likelihood of a patient receiving adequate counselling on healthy behaviours depends on their health worker's own lifestyle and behaviours (Abramson et al. 2000, Duperly et al. 2009). Surveillance of healthy behaviours and risk factors to development of NCDs is crucial to monitoring of preventive interventions adopted.

The WHO describes the risk factors of NCDs constitute four particular behaviours to which an individual is exposed to that lead to four key metabolic changes in the individual (WHO 2011a). A failure to control the exposure to the risk factors among individuals results in development of NCDs. The WHO has therefore classified the risk factors into 2 groups namely behavioral and physiological.

The WHO in recognition of the emerging epidemic of NCDs globally developed a mechanism to encourage middle and low income countries to conduct surveillance activities on NCDs risk factors within the population (WHO 2014b). The tool is designed in such a way that countries can adjust it to suit their local setting. The data collected on risk factors is by questionnaire on behaviour, physical measurements and biochemical measurements. This is the WHO steps tool (WHO 2014e).

1.2 Problem statement

The constitution of Kenya 2010 accords its citizens "the right to the highest attainable standard of Health" (GoK 2010) and Kenya's MoH mission is to "build a progressive, responsive and sustainable health care system for accelerated attainment of the highest standard of health to all Kenyans" (GoK 2014).

Health care workers are a crucial resource to attainment of these goals and it is expected that they lead healthy lifestyles as they serve as both educators and role models in health seeking practices (Skaal & Pengpid 2011). However, it has been found that this population is afflicted by NCDs and they have unhealthy habits that predispose them to NCDs (McEwan et al 2000, Vasquez-Martínez JL et al 2005 cited in Skaal & Pengpid, 2011). Students in training for health sciences have also been found to have risk factors for NCDs though these studies have been conducted among undergraduate students (Anand et al. 2011, Srivastava et al. 2013, Van den Berg et al. 2012).

Persistence of this gap in health role modelling is likely to hamper progress towards attainment of Kenya's health goals and possibly lead to a sickly HCWs population burdened with NCDs in the future. This study sought to investigate the prevalence of NCDs behavioral risk factors and their association with socio-demographic characteristics among postgraduate students of the college of health science at the University of Nairobi using the WHO steps tool.

1.3 Justification

Postgraduate students at the UoN, College of Health Sciences are qualified HCWs who are undergoing specialized training in various disciplines of human health. Studies have demonstrated a high prevalence of behavioral risk factors among university students undergoing training in health sciences. Inadequate physical activity and consumption of fruit and vegetables have stood out prominently in these studies (Anand et al. 2011, Dalia et al. 2014, Van den Berg et al. 2012).

It is known and documented that HCWs who practice healthy behaviour tend to counsel their patients on developing healthy habits and the reverse is true (Abramson et al. 2000, Oberg & Frank 2009). The postgraduate students will be instrumental in implementation of interventions for mitigating the NCDs and other disease conditions upon completion of their studies. It is therefore imperative that the health status and lifestyle of postgraduate students who are training as HCWs be in line with the nation's health goals so as to deliver the promise of delivering the best health for all.

Left unchecked, the burden of NCDs is devastating to a nation's development. At the micro-level, they lead to loss of household income by preventing people from working or seeking employment. At the macro-level, national budgets are being commonly being directed towards treatment of NCDs (WHO 2011b).

National and population specific data on NCDs risk factor burden is lacking in Kenya and an assessment of the NCDs risk factor status among university students and specifically HCWs undergoing postgraduate training in Kenya has not been done. This study focused on the behavioral risk factors of NCDs. This study aimed to assess the exposure of postgraduate students in the College of Health Sciences at the University of Nairobi to behavioral risk factors for development of NCDs using the WHO steps questionnaire (WHO 2014c) (Step 1). The results will be useful to the MoH and training institutions in the development of policies that will facilitate healthy behaviours among HCWs in training and at the workplace with an end goal of improving health service delivery for better health outcomes in the nation.

1.4 Research Questions

1. What are the socio-demographic characteristics of postgraduate students in College of Health Sciences at University of Nairobi?
2. What is the prevalence of behavioral risk factors to development of NCDs among postgraduate students in College of Health Sciences at University of Nairobi?

3. Do the postgraduate students in College of Health Sciences at University of Nairobi have a clear understanding of the published WHO recommendations on NCDs behavioral risk factors?
4. Do the postgraduate students in College of Health Sciences at University of Nairobi undergo screening for NCDs?

1.5 Conceptual Framework

The risk factor assessment in this study was based on the WHO steps. The steps framework's first level of risk assessment involves self-reporting by questionnaire at step 1. The data collected comprised the predictor variables measured in this study namely age, sex, marital status and area of study (type of occupation) and the outcome variables which comprised the behavioral risk factors namely tobacco use, alcohol use, physical activity level and dietary habits. The environmental factors (Globalization, Nutrition transition, Attractive marketing of unhealthy goods and Energy saving technologies) contributing to the exposure to behavioral risk factors were not measured as they were beyond the scope of this study. The interaction of predictor and outcome variables may eventually lead to development NCDs by the postgraduate students who are HCWs and therefore inadequate counselling of patients on health promoting behaviours which were not the focus of this study. This is shown in figure 1.1.

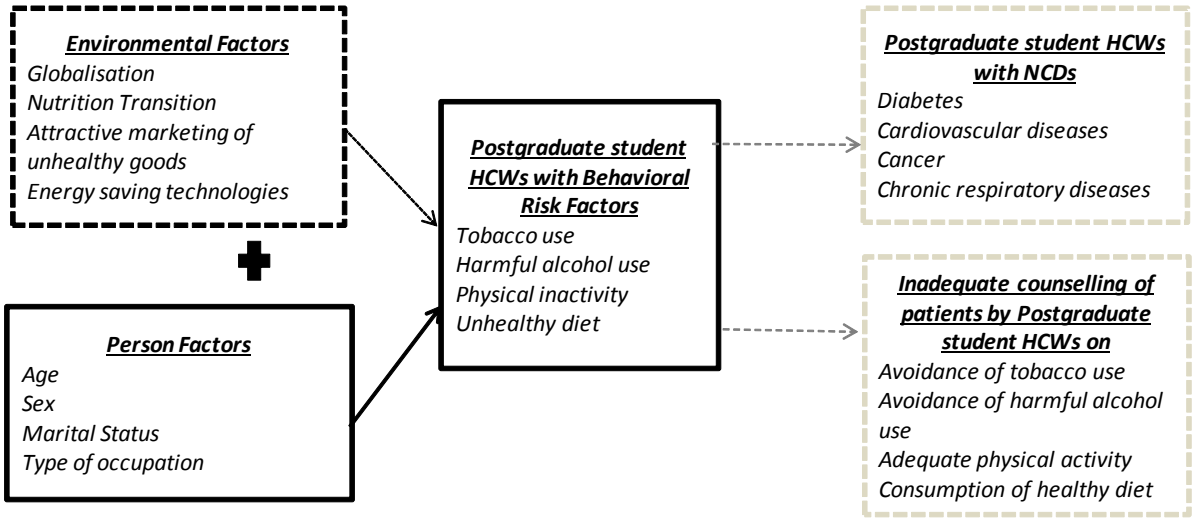


Figure 1.1: Conceptual Framework

1.6 Objectives

1.6.1 General

1. To assess the prevalence of NCDs behavioral risk factors in postgraduate students of the College of Health Sciences at the UoN.

1.6.2 Specific objectives

1. To determine the prevalence of behavioral risk factors among participants in the study.
2. To determine the association of the NCDs behavioral risk factors with social and demographic characteristics of participants in the study.
3. To determine the knowledge of the published WHO recommendations on behavioral risk factors by participants in the study.
4. To determine the uptake of screening services for selected NCDs by participants in the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Non-Communicable Diseases are diseases that are responsible for a large share of the morbidity and mortality across the globe. Africa is the only continent whose leading cause of mortality is not NCD but it is projected that by year 2020 Africa will have the largest increases in NCDs (WHO 2013c).

Health care workers (HCWs) are afflicted by health problems of both communicable and non-communicable nature. It is generally expected that HCWs have a superior advantage over the general public in preventing illness and disease. However, the NCDs have for a long time been referred to as 'lifestyle diseases' (Ligami 2012) and the risk factors that lead to development of NCDs are largely preventable (WHO 2013c). Therefore HCWs are considered to be professionals should act as health role models for their patients by leading a healthy lifestyle in order to prevent illness and diseases (Skaal & Pengpid 2011). In reality, this is not the case.

A study on cardiovascular disease risk factors among HCWs in Veracruz, Mexico demonstrated that female HCWs had higher prevalence of obesity (52%) than males (23%) (González-Velázquez & Mendez 2007). Health workers also have risky health behaviours, such as reluctance to seek health information, alcohol use and smoking (McEwan et al 2000, Vasquez-Martínez et al 2005 cited in Skaal & Pengpid, 2011). A comparative study from a South African tertiary hospital revealed that more than 70% of HCWs had above

normal weight with women being heavier than men at 76.5% vs 60.5% respectively. Obesity prevalence was similar between medical and non-medical staff members, regardless of their socio-demographic factors. It was also found that the prevalence of diabetes, hypertension and cardiovascular disease was higher in the medical group than in the non-medical group (Skaal & Pengpid 2011).

A quasi-experimental study carried out in South Africa tested an increase in physical activity by HCWs in following application of Transtheoretical Model (TTM) which is a behaviour change tool. The authors found that post-intervention, there was improvement in exercise practices of HCWs (Skaal & Pengpid 2012). Obesity among HCWs has been reported previously in other studies conducted in Mexico (Rodríguez et al. 2006), USA (Han et al. 2011) and Nigeria (Iwuala et al. 2015). This finding suggests that it is possible to prevent obesity among HCWs through lifestyle and behaviour change.

The lifestyle of HCWs has a bearing on how they provide health services. A cross-sectional survey conducted among physicians in the United States reported that physicians who performed exercise regularly tended to counsel their patients on the benefits of exercise (Abramson et al. 2000). A similar study was conducted in Colombia among medical students and it was found that there was a correlation on healthy behaviour practices with positive attitude towards preventive behavior counseling to patients (Duperly et al. 2009).

University students form a rich resource for the future workforce of any nation and HCWs training involves learning in practice where the postgraduate training comprises both learning and providing health service to patients. Medical students in Western Uttar Pradesh, India were assessed for load of lifestyle associated risk factors to NCDs and it was found that prevalence of tobacco use was 6.4%, heavy alcohol use 3.8%, more than half had low levels of physical activity and unhealthy diet (Srivastava et al. 2013). Female university students in health colleges were assessed on risk factors for NCDs using the WHO steps tool in Saudi Arabia. The study found that majority of the students were physically inactive and consumed low levels of fruit and vegetables (Dalia et al. 2014).

In South Africa, an assessment of body weight and dietary habits was carried out in nursing students and it was found that half of them had above normal BMI and majority recorded low intake of fruit and vegetables (Van den Berg et al. 2012). A search for publications on studies conducted among postgraduate university students in East Africa and Kenya specifically did not yield results.

It is assumed that HCWs are aware of the risk factors of NCDs but it is apparent that HCWs have risk factors and are likely to be afflicted by NCDs. A search for publications on NCDs risk factor burden among Kenya's HCWs as well surveys on NCDs risk factor burden among Kenyan university postgraduate students did not yield any results. An unpublished survey of cardiovascular disease (CVD) risk factor burden among undergraduate students of University of Nairobi was found and it reported presence of risk factors for CVD with alcohol consumption having the highest prevalence of 51.9%, elevated BMI and hypertension at 13.7% and physical inactivity at 11.9% (Warutere 2013).

Surveillance of NCDs in Kenya is not conducted in an organized nor integrated manner. There are no policies developed towards NCDs surveillance and information collection on NCDs burden is carried out by various entities for their specific uses. Publications on NCDs status and specifically behavioral risk factors in Kenya are few and they represent small studies done on specific populations. A household survey was conducted in Kibera, an urban slum to assess diabetes and its correlates among the adult population using the WHO steps tool. The authors found tobacco use prevalence at 13.1%, alcohol consumption at 74.9% and high level of physical activity at 75.7%. They did not report on dietary habits in their sample (Ayah et al. 2013). There has been no survey carried out on NCDs risk factor burden using the WHO steps tool nationally.

2.2 Behavioral Risk Factors

In their review of the NCDs situation in South Africa, Pouane et al classified the risk factors of NCDs into two groups namely biological (genetics, high blood cholesterol, excessive body weight, hypertension, type 2 diabetes, early life origin) and behavioral (unhealthy diet, physical inactivity, tobacco use, misuse of alcohol). They further mention that risk factors can be considered as modifiable for instance living conditions, socio-cultural factors and community/individual influences. Non-modifiable risk factors are described as those that cannot be altered by the individual such as age, sex and heredity (Puoane et al. 2008).

The WHO has classified the risk factors into 2 groups namely behavioral and physiological. A causal chain to development of NCDs has been described (WHO 2005).

The behavioral risk factors lead to reversible metabolic changes in form of the physiological risk factors which if not addressed cause the irreversible organ damage that is the NCDs outcomes. This demonstrates the cumulative nature of the risk factors and the gradual progression to irreversible morbidity of NCDs. There are opportunities for intervention presented at the level of behavioral and physiological risk factors before irreversible damage is established.

The modifiable/behavioral and physiological risk factors have been found to contribute to a wide range of NCDs. Some of the risk factors cause disease in isolation but most NCDs result from cumulative exposure to several risk factors. On the other hand, each of the risk factors contributes to development of more than one NCDs.

It is for this reason that health authorities such as the WHO have developed strategies to address the behavioral and physiological risk factors which are amenable to intervention and are thus the focus of prevention and control measures of NCDs. The focus of this study will be on the behavioral risk factors among postgraduate students at the college of health sciences in the UoN.

2.2.1 Unhealthy diet

An unhealthy diet is one that fails to give your body with the variety of nutrients for optimal health. It is characterized by low intake of fruit and vegetables, high in salt, sugar and fat intake (WHO 2013d). According to WHO, 1.7 million (2.8%) of deaths worldwide

are attributable to low fruit and vegetable consumption. The WHO recommends that a healthy diet constitutes increased fruit, vegetables, legumes, nuts and grains intake while cutting down on salt, sugar and fats. They advise to choose unsaturated fats, instead of saturated fats and towards the elimination of trans-fat intake. The Harvard School of Public Health recommends avoidance of saturated fats found in red meat, butter, cheese, palm oil as well as hydrogenated oils. They do recommend intake of unsaturated fats including olive oil, soy bean oil and sunflower oil (Harvard School of public Health 2015). Recent studies however have reported that saturated fats intake is not associated with heart disease and stroke as previously concluded. They however did find an association between trans-fat intake and CVD (de Souza et al. 2015, Siri-Tarino et al. 2010). Improving dietary habits is a societal problem which requires a multisectoral, population-based and culturally relevant approach.

2.2.2 Physical Inactivity

The WHO recommends that adults engage in at least 2.5 hours of at least moderate-intensity aerobic physical activity or 1.25 hours of vigorous-intensity aerobic activity daily throughout the week or an equivalent sum of both that will yield at least 600 metabolic equivalents of task (MET) minutes per week to get a health benefit (WHO 2011c, WHO 2012).

Physical inactivity and poor diet are great risk factors for NCDs as they contribute to an individual being overweight or obese by raising the body mass index (BMI) which in turn predisposes an individual to NCD. It is estimated that approximately 6% of global deaths are attributable to physical inactivity (WHO 2011a). A study done in the 15 member states of European Union (EU) to compare BMI and levels of physical activity found that in

both sexes, the longer time one spent sitting down, the higher the BMI (Martínez-González et al. 1999).

The CDC outline the benefits of adequate physical activity to include reduced risk of obesity, CVD, some cancers, type 2 diabetes and strengthening of bones (CDC 2011). This suggests that physical activity is an important intervention to adopt in order to curb the development and progression of several preventable NCDs.

According to two national surveys done in East African, it has been found that the region has a relatively lower risk of physical inactivity. The Tanzania and Zanzibar national WHO STEPS surveys conducted in 2012 and 2011 respectively, report the prevalence of adequate physical activity level to be 92.5% and 82.4% (Ministry of Health Zanzibar 2012, WHO 2013a). A population based survey done in an informal settlement in Nairobi using the WHO STEPS tool reported a prevalence of adequate physical activity among the residents to be 75.7% (Ayah et al. 2013). In both regions, men were found to have higher physical activity levels when compared to women with Zanzibar reporting 80% vs 50.7% and Kibera reporting 79.1% vs 70% (Ministry of Health Zanzibar 2012, Ayah et al. 2013).

2.2.3 Harmful use of alcohol

Excessive use of alcohol is considered harmful and has resulted in approximately 3.8% of all deaths in the world. A causal relationship is described between high levels of alcohol consumption and an increasing risk of some cancers, liver diseases and cardiovascular

diseases (WHO 2011a) by the toxic effect of acetaldehyde (a metabolite of alcohol) (Parry et al. 2011). Heavy episodic drinking is excessive use of alcohol and is described as consumption of 6 or more alcoholic drinks in one occasion (WHO 2015e) and has been found to be more among the men than women (WHO 2010).

The effect of alcohol on CVD is complex as it depends on the quantity and pattern of consumption. Excessive use is associated with hypertension, dyslipidemia and an inflammatory state that promotes atherosclerosis, hypertension and vascular disease (Mukamal & Rimm 2001). Kenya has been battling with a long history of alcohol misuse and abuse among its population. The National Campaign Against Drug Abuse Authority (NACADA) report that the prevalence of alcohol use in Kenya reduced from 14.2% in 2007 to 13.6% in 2012 albeit with regional and alcohol type differences. This national survey reported men's alcohol use to be more than women's and that Nairobi city recorded the highest prevalence at 22% (NACADA 2012).

The Kenya Government adopted the Alcoholic Drinks Control Act of 2010 (Kenya Law Reports 2014a). This law regulates the manufacturing, sale and consumption of alcoholic drinks in Kenya. A population based survey conducted in one of Nairobi's informal settlements reported high levels of alcohol consumption with an alcohol use prevalence of 74.9% (Ayah et al. 2013) whereas national surveys conducted in Tanzania and Zanzibar reported alcohol use overall prevalence rates of 29.3% in Tanzania and 1.7% in Zanzibar which is predominantly a Muslim state. The authors attributed the consumption reported to tourists consuming alcohol (Ministry of Health Zanzibar 2012, WHO 2013a).

2.2.4 Tobacco use

Tobacco use is any habitual use of the tobacco plant leaf and its products (Al-Ibrahim, Mohamed S Gross 1990). It can be either in smokeless (chewing or sniffing) or smoking forms. The British doctors cohort study demonstrated significantly increased morbidity and mortality in the smoking group in comparison to the non-smoking group. Positive associations were made on smoking with diseases such as cancers of the gut and bladder; vascular diseases and chronic obstructive pulmonary disease (Doll et al. 1994).

Tobacco smoke contains smoke that is made up of more than 7,000 chemicals, 60 of which are known to cause cancer (carcinogens) (American Cancer Society 2013) and smokeless tobacco contains at least 28 chemicals in smokeless tobacco have been found to cause cancer (National Cancer Institute 2013).

The Kenya government is party to the Framework Convention on Tobacco Control (FCTC) since 2004 and assented to the Tobacco Control Act in 2008 (Kenya Law Reports 2014b) which regulates the marketing and sale of tobacco products as well as standardized product labeling with health messages. A study done in Kenya found an overall prevalence of smoking to be 54% (men-63.9%, women-7%) in 1988 (Nturibi et al. 2009) while NACADA reported a national prevalence of tobacco use among adults to be 10.9% in 2007 and 8.6% in 2012 (NACADA 2012). This may have resulted from the impact of

health messages on harmful effects of tobacco use as well as government efforts towards control of tobacco use in the period between 1988 and 2014.

The study conducted in Kibera slum, Nairobi reported tobacco use prevalence to be at 13.1% (Ayah et al. 2013). Zanzibar and Tanzania conducted a national WHO steps survey and reported tobacco use prevalence of 11.4% and 15.9% overall for both smoked and smokeless tobacco respectively. In both surveys, smoked tobacco was more popular and men users were more than women users (Ministry of Health Zanzibar 2012, WHO 2013a).

CHAPTER 3: MATERIALS AND METHODS

3.1 Study Area

The study was conducted in the College of Health Sciences at The University of Nairobi. The college was established in 1985 and it consists of Schools of Medicine with 13 departments, Pharmacy (1995) with three departments, Dental Sciences (1995) with four departments, Nursing Sciences (2004) and Public Health (2010). The college houses the Institute of Tropical and Infectious Diseases (UNITID) (2004) and the Centre for HIV and AIDS Prevention and Research (CHIVPR) (2006). Chiromo campus is located approximately 2km from Central Business District (CBD) of Nairobi City and is home to the anatomy department, physiology department and biochemistry department of the school of medicine. The KNH is a tertiary teaching and referral hospital located in the city of Nairobi, approximately 4km from the CBD and has a total bed capacity of 1800 with 50 wards, 22 out-patient clinics, 24 theatres (16 specialized) and Accident & Emergency Department. It covers an area of 45.7 hectares and within the KNH complex are College of Health Sciences (University of Nairobi); the Kenya Medical Training College; Kenya Medical Research Institute and National Laboratory Service (Ministry of Health). The College of Health Sciences had 703 postgraduate students in the year 2015.

3.2 Study Design

This was a cross-sectional study.

3.3 Study Population

The population was postgraduate students in the college of health sciences at the University of Nairobi.

3.4 Inclusion Criteria

The criteria used to enroll participants into the study was as follows:

1. Student undergoing postgraduate training in college of health sciences at University of Nairobi.

3.5 Exclusion Criteria

The criteria used to exclude participation into the study was as follows:

1. Those who declined to give consent to participate in the study

3.6 Sample Size Determination

Access to local publications on the prevalence of behavioral risk factors for NCDs among university students nor the HCWs population in Kenya was limited. Sample size determination was based on the Srivastava et al. 2013 publication where they reported prevalence of tobacco use among the medical students was at 6.4% (Srivastava et al. 2013). This was factored in the formula with finite population correction (Daniel 2009) and with the following assumptions, sample size was determined as shown below.

$n = \frac{N(Z^2_{1-\propto/2})p(1-p)}{d^2(N-1)+ (Z^2_{1-\propto/2})p(1-p)}$ where:

n = sample size with finite population correction

$Z_{1-\propto/2}$ = 1.96 = value of the standard normal distribution corresponding to a significance level of α (1.96 for a 2-sided test at the 0.05 level)

$Z^2_{1-\propto/2}$= 1.96^2 = 3.842

N = 703 = Postgraduate student population

p = prevalence estimate

p = proportion of tobacco users= 6.4% = 0.064 (*p* based on the Srivastava et al. 2013 study)

d = maximum tolerable error for the prevalence estimate = 0.02

$d^2 = 0.0004$

$n = \frac{703 * 3.842[0.064(1-0.064)]}{0.0004\ (703-1) + \ 3.842[0.064(1-0.064)}$ = 299

A 10% attrition rate was considered and therefore 30 subjects were added.

Total sample size = 299 + 30 = 329

3.7 Sampling

Study participants were selected by simple random sampling method. The sampling frame was the student register at the college of health sciences. The list of students enrolled and their contacts was obtained from the college registrar. This list was then subjected to randomization using MS Excel 2007 program and following the randomization, 329 individuals were selected to form the sample for this study.

3.8 Study methods

Participants were recruited at the University of Nairobi College of Health Sciences premises where trained research assistants contacted the selected individuals and introduced themselves to a potential participant. They then gave a brief summary of the research study including the procedures to be undertaken, benefits and potential risks of participating. She/he then sought for written consent to recruit the individual into the study. Upon giving written consent, an individual was recruited into the study where participants filled in a questionnaire.

Trained research assistants issued the questionnaire for the participant to fill in. The questionnaire sought information on demographic information, past and present history of exposure to risk factors of NCDs and understanding of the published WHO recommendations on each risk factor by the participant. Questionnaires were filled in a quiet room where both the research assistant and participant were seated. Research assistants were available to address any clarifications required by the participant.

Study Variables

Current tobacco smokers were those who were smoking cigarettes, cigars, shisha or hand-rolled cigarettes at the time of the study.

Current alcohol users were those who reported to consuming alcohol within the past 30 days.

Heavy episodic drinking was consumption of 6 or more alcoholic drinks in one occasion.

One standard drink was considered as consuming a 300 ml bottle of regular beer, 30 ml of spirits or a 120 ml glass of wine.

One serving of vegetable was considered to include a handful of leafy vegetables, 8 florets of cauliflower/broccoli or 3 tablespoons of kidney beans/peas/boiled maize

One serving of fruit was considered to be 1 medium sized banana or orange or mango or a handful of grapes.

Knowledge of published WHO guidelines on behavioral risk factors by participants was assessed asking whether he/she had a clear understanding of the published WHO guidelines for each of the behavioral risk factors. The participant would record 'yes' or 'no' in the questionnaire.

Uptake of screening services for selected NCDs by participants was assessed by asking whether he/she had undergone screening for elevated blood pressure, blood glucose, blood cholesterol and cervical cancer for women in their lifetime.

Definition of Outcome Variables

Tobacco use was computed from the observations of current tobacco smokers.

Harmful alcohol use was defined and measured as heavy episodic drinking which constituted an individual's intake of 6 or more standard drinks in one occasion.

Fruit and vegetable consumption was computed as the sum of the average intake of vegetable and fruits servings per day using the formula $\left(\frac{\text{veg days per week} \times \text{veg servings}}{7} + \frac{\text{fruit days per week} \times \text{fruit servings}}{7}\right)$. A consumption of less than 5 servings was considered inadequate (WHO 2015b).

Physical activity was computed as the sum of the total MET-minutes for work, travel and recreation activities per week. The product of each activity, it's duration in minutes and it's MET value was compounded by the number of days done per week and these are summed up to yield an individual's MET-minutes per week. Physical Inactivity was defined fewer than 600 MET-minutes per week (WHO 2012).

3.9 Data handling

3.9.1 Data collection

Data were collected using a modified and pretested WHO steps questionnaire (see appendix 2). The researcher modified the WHO steps questionnaire (WHO 2014c) to suit the local setting by using local terms to identify items and including a question on the level of understanding of published WHO guidelines on behavioral risk factors. The collection was done by the participants taking a self-administered questionnaire with the research assistant at hand to clarify any issues.

3.9.2 Data entry and quality control

Data were entered by the primary investigator into stata version 12 database. The entered data were checked for completeness and consistency before analysis.

3.9.3 Data analysis

Data were analyzed using stata version 12 software. Univariable analysis was done for descriptive variables such as age, sex, as well as the outcome variables. The total number of responses and frequency of distributions was displayed for each variable. The outcome variables were summarized as proportions in form of percentage of the sample.

Bivariable analysis using Pearson's Chi Square was carried out to compare the association between each descriptive variable and each outcome variable. Multivariable analysis was carried out using multiple logistic regression to compare each outcome variables with the predictor variables. Odds ratio was calculated as the measure of association with a confidence interval of 95%.

3.10 Ethical Considerations

Ethical approval was given by University of Nairobi/KNH Ethical review committee. Informed consent was gotten from all participants before the interview. Benefits and potential risks that the participant may suffer were communicated. Participation in this study was voluntary. The participant was at liberty to stop the interview at any time. Upon completion of the questionnaire the research assistant thanked the participant and stored the filled in questionnaire in a secure storage box. The contact details of study participants were not included and data were backed up in secured external hard disks to ensure confidentiality.

3.11 Study Limitations

- The study was limited to Step 1 of the WHO STEPS tool as step 2 and 3 involves body measurements and biomedical laboratory measurement which were not be carried out due financial constraints.
- The study relied on the memory of the participants therefore recall bias may have been recorded in the self-administered questionnaire.
- The STEPS methodology is not designed to measure total energy intake and accurate physical activity.

CHAPTER 4: RESULTS

4.1 Demographic and Social Characteristics of Participants

A total number of 303 participants were enrolled into the study representing a 92% response rate. Men constituted 57.6% (n=174) whereas women constituted 42.4% (n=129) of participants as shown in table 4.1.

Table 4. 1: Demographic and Social Characteristics of Participants

Characteristic	Categories	Frequency	Percentage (95%CI)
Sex	Male	174	57.6 (51.8, 62.9)
	Female	129	42.4 (37.1, 48.2)
Age Group	26-30 years	160	52.8 (47.2, 58.4)
	31-35 years	116	38.3 (33.0, 43.9)
	Above 35 years	27	8.9 (6.2, 12.7)
Marital Status	Never married	116	38.3 (33.0, 43.9)
	Currently Married	164	54.1 (48.5, 59.7)
	Other marital status	23	7.6 (5.1, 11.1)
Area of Study	Medicine	232	76.6 (71.5, 81.0)
	Nursing	15	5.0 (3.0, 8.0)
	Pharmacy	26	8.6 (5.9, 12.3)
	Public Health	16	5.3 (3.3, 8.4)
	Dentistry	14	4.6 (2.8, 7.6)
Highest Level of Education Completed	College/University	236	77.9 (72.9, 82.2)
	Postgraduate degree	67	22.1 (17.8, 27.1)
Main Work Status	Government employee	218	71.9 (66.6, 76.7)
	Private sector employee	49	16.2 (12.5, 20.7)
	Self-employed	9	3.0 (1.6, 5.6)
	Volunteer	2	0.7 (0.2, 2.4)
	Homemaker	8	2.6 (1.3, 5.1)
	Unemployed (able to work)	17	5.6 (3.5, 8.8)

Most of the participants (n=160) were aged between 26 and 30 years and the minority (n=27) were aged above 35 years at the time of the study.

The majority of the participants (n=164) were married at the time of the study while the minority (n=23) were in other marital status that comprised widowed (n=4), separated (n=3), divorced (n=3) and cohabitating (n=10). The rest (n=116) of the participants had not been married at time of study.

The School of Medicine had the highest number of participants who numbered n= 232 (76%) enrolled whereas Dental School had the least in number n = 14 (4.6%).

All of the participants had completed university or college education with 67 of them having completed a postgraduate degree at the time of the study. Most of the participants were government employees (n=218) at the time of the study while some participants (n=17) were unemployed despite being able to work.

The majority (n=163) of the participants recorded their average monthly income in the household and 140 of the participants opted not to record income. Among those who recorded men outnumbered women (n=100 vs n= 63) with no sex disparity of the median monthly income as shown in table 4.2.

Table 4. 2: Monthly Household Income by Sex

		Monthly Household Income (Ksh)				
		Median	Minimum	Maximum	Percentile 25	Percentile 75
Sex	Male	120,000	40,000	1,200,000	100,000	182,956
	Female	120,000	30,000	1,400,000	100,000	200,000

4.2 Prevalence of Behavioral Risk Factors

4.2.1 Tobacco smoking

Two hundred and eighty-four participants (93.7%) were non-smokers during the study period. Among those who reported smoking in the study, the majority were males (n=17 vs n=2). Tobacco use is summarized in Table 4.3.

Table 4. 3: Distribution of Tobacco Smoking

	N=303	
Tobacco use	Frequency	% (95%CI)
Current smoker		
Yes	19	6.3 (4.1, 9.6)
No	284	93.7 (90.4, 96.0)
Sex of Current Smoker		
Male	17	89.5 (68.6, 97.1)
Female	2	10.5 (2.9, 31.4)
Smoke Tobacco Daily		
Yes	8	47.1 (26.2, 69.0)
No	9	52.9 (31.0, 73.8)
Age of First Smoking Episode		
Less than 20 years old	9	56.3 (33.2, 77.0)
More than 20 years old	7	43.7 (23.1, 66.8)
Attempt to quit smoking		
Yes	7	41.2 (21.6, 64.0)
No	10	58.8 (36.0, 78.4)
Exposed to passive tobacco smoke		
At home	38	12.6 (9.3, 16.7)
At work	73	24.2 (19.6, 29.2)

Eight (8) of the male current tobacco smokers reported daily use and none of the female smokers recorded whether or not they smoked daily. Sixteen of the current smokers recorded the age they first smoked with 9 of them being under 20 years of age when they began smoking and 7 of them over 20 years of age. Among the current smokers, 7 (41.2%) of them had attempted to quit smoking tobacco. The majority of the participants were not exposed to passive tobacco smoke as only 38 of the participants reported exposure at home and 73 reported exposure at work.

4.2.2 Heavy Episodic Drinking

Most of the respondents [n= 210, 69.3% (64.0, 74.2)] reported to have used alcohol in their lifetime. Men had a higher proportion than women (n=129 vs n=88). One hundred and seventy-six (176) respondents had consumed alcohol in the past 1 year and 133 respondents reported to have consumed in the 30 days prior to the study (current alcohol users). Figure 4.4 summarizes the distribution.

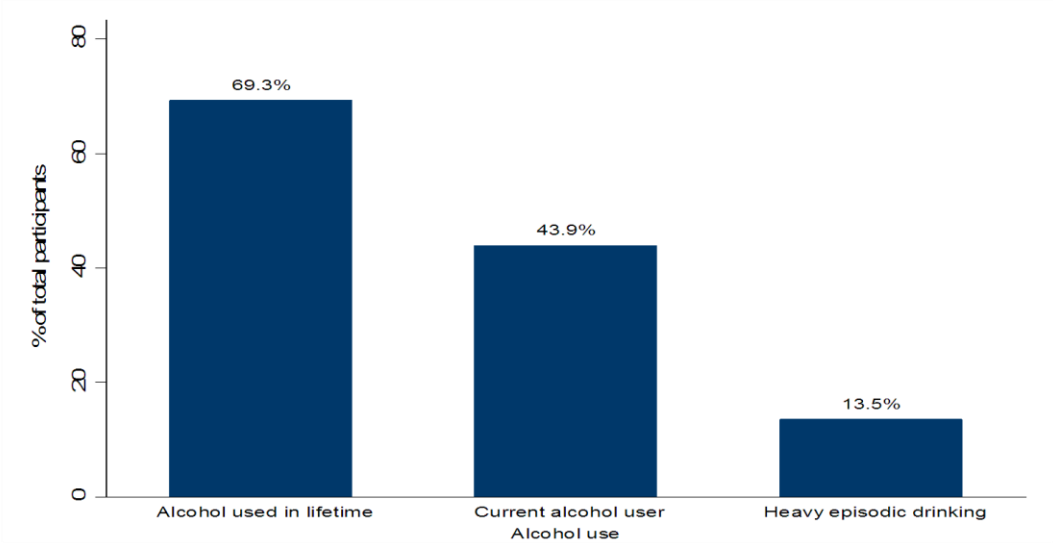


Figure 4.1: Distribution of Alcohol Use Among Participants

Overall proportion of current alcohol users was 43.9% (38.4, 49.5) of all participants with men being more than women at n = 95 and n = 38 respectively. Majority of the current alcohol users (73 in number) reported consumption of less than 6 drinks per sitting in the 30 days prior to the interview. The proportion of participants with history of harmful alcohol (n=41) use where they consumed more than 6 drinks in a sitting (heavy episodic drinking) in the study was 13.5% (10.1, 17.8). The median number of drinks consumed in the 7 days prior to interview was 4 (range 1-30) for men and 2 (range 1-42) for women.

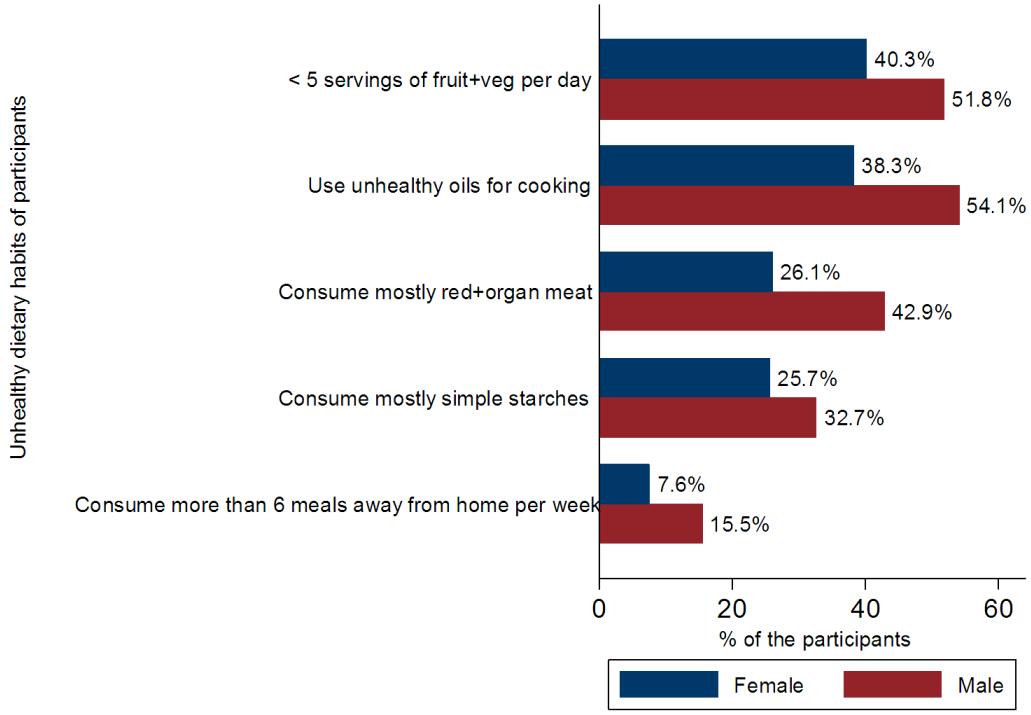
4.2.3 Diet

A larger proportion of the participants 93.1% (89.6, 95.4) recorded low fruit and vegetable consumption (n = 282). More vegetables than fruit was consumed by participants of this study as shown in table 4.4. The median number of days in a week when vegetables were consumed was 6 compared to 4 for fruit. The median number of servings of vegetables per day was 2 compared to 1 for fruit.

Table 4. 4: Median consumption of Vegetables and Fruits

	Days of fruit/week	Servings of fruit/day	Servings of veg/day	Days of veg/week
Median	4	1	2	6
Minimum	0	0	0	0
Maximum	7	7	14	7

Adequacy of vegetable and fruit consumption was computed as the sum of the average intake of vegetable and fruits per day using the formula ($\frac{\text{veg days per week} \times \text{veg servings}}{7} + \frac{\text{fruit days per week} \times \text{fruit servings}}{7}$). A consumption of less than 5 servings was considered inadequate. Figure 4.5 summarizes the dietary habits of the participants by demonstrating the unhealthy habits graphically.



*Does not include 5 missing records in type of cooking oil used and 28 missing records in meals away from home

Figure 4.2: Distribution of the unhealthy dietary habits of participants

More than 90% of the participants reported use of unhealthy oil (vegetable oil that is not specified by manufacturer, butter or ghee, margarine and included those who reported use of "none in particular") in their household cooking. Vegetable oil was the most commonly used. Among the participants who used healthy oil (corn oil, olive oil, sunflower oil, coconut oil) in their cooking, women were more than men (n=12 and n=6 respectively).

The majority of the participants [69% (63.6, 73.9)] reported consumption of mostly red and organ meats for animal protein in their household with men being more than women (n=130 and n=79 respectively). More than half of the participants (n=117) reported consumption of mostly simple starches (carbohydrates) in their household. Among these

participants, men were more than women (n=99 and n=78 respectively). Most of the participants [66.7% (61.2, 71.7)] had fewer than 6 meals not prepared at home per week.

4.2.4 Physical Activity

The majority of the participants (53.8%) engaged in walking or cycling when travelling from place to place whereas a minority of the participants were involved in moderate intensity activity and vigorous intensity activity at their work representing 41.6% and 12.2% respectively. A larger proportion of the participants were not involved in vigorous nor moderate intensity sport accounting for 64.4% and 59.1% respectively. In all the categories for physical activity except vigorous work activity done, men were proportionately more than women as represented in Table 4.5.

Table 4. 5: Physical activity by sex of participants

Physical Activity	n [% (95%CI)]		
	Male n=174	Female n=129	Both sexes N=303
Walk or cycle for travel >10 minutes/day	91 [52.3(44.9, 59.6)]	72 [55.8 (47.2, 67.1)]	163 [53.8 (48.2, 58.3)]
Vigorous work activity done	18 [10.3 (6.6, 15.8)]	19 [14.7 (9.6, 21.9)]	37 [12.2 (9.0, 16.2)]
Moderate work activity done	72 [41.4 (34.3, 48.8)]	54 [41.9 (33.7, 50.5)]	126 [41.6 (36.2, 47.2)]
Vigorous sport done	64 [36.8 (30.0, 44.2)]	44 [34.4 (26.5, 42.6)]	108 [35.6 (30.5, 41.2)]
Moderate sport done	70 [40.2 (33.2, 47.7)]	54 [42.2 (33.7, 50.5)]	124 [40.9 (35.5, 46.5)]
MET per week			
Less than 600	53 [30.5 (24.1, 37.7)]	44 [34.1 (26.5, 42.6)]	97 [32.0 (27.0, 37.5)]
600 and more	121 [69.5 (62.3, 75.9)]	85 [65.9 (57.4, 73.5)]	206 [68.0 (62.5, 73.0)]

Adequacy of physical activity was computed as the sum of MET for walking, work and sport activities in a week. Adequate levels were defined as 600 and more MET-minutes

per week. Inadequate levels were termed as physical inactivity. The majority of the participants [68.0% (62.5, 73.0)] recorded adequate levels of physical activity per week (≥600 MET) with men being proportionately more active than women. The median duration of activity is shown in table 4.6.

Table 4. 6: Median Duration of Activity

	Vigorous work(minutes /day)	Moderate work(minutes /day)	Vigorous sport (minutes/ day)	Moderate sport (minutes/ day)	Sitting (minutes/ day)	Walking or Cycling(minutes/day)
Median	40	120	60	42	300	30
Minimum	5	2	1	5	30	5
Maximum	480	720	240	240	1080	405

Participants recorded longer duration for sitting (sedentary behaviour) than walking, work or sport activities.

4.2.5 Number of Behavioral Risk Factors Present per Participant

Two hundred and eighty-nine participants (n=289, 95.4%) recorded presence of 1 or more of the behavioral risk factors which were the outcomes of the study (Tobacco smoking, heavy episodic drinking, low fruit and vegetable intake, physical inactivity). Two (2) of the participants possessed all the 4 outcomes and fourteen (14) accounting for 4.6% of the study participants did not possess any of the outcomes as shown in table 4.7.

Table 4.7: Distribution of Behavioral Risk Factors Among Participants

Behavioral Risk Factor	Number of Participants	Percentage (95%CI)
None present	14	4.6 (2.8, 7.6)
1 or more present	289	95.4 (92.4, 97.2)
All 4 present	2	0.7 (0.2, 2.4)

4.3 Association of Behavioral Risk Factors with Age, Sex, Marital Status and Area of Study

Strength of association between outcome variables (tobacco smoking, heavy episodic drinking, low fruit and vegetable intake, inadequate physical activity) and each of the predictor variables (sex, age, marital status, area of study) was measured using Chi Square as the bivariate analysis method.

4.3.1 Tobacco Smoking

Strength of association of tobacco smoking with the predictor variables is summarized in tables 4.8.

Table 4. 8: Association of tobacco smoking with sex, age, marital status and area of study

Sex	Tobacco Smoking		χ^2 value	p-value
	No	Yes		
Male	157 (90.2%)	17 (9.8%)	8.5158	0.004
Female	127 (98.4%)	2 (1.6%)		
Age				
25 – 30	152 (95.0%)	8 (5.0%)	1.5932	0.451
31 – 35	108 (93.1%)	8 (6.9%)		
Above 35	24 (88.9%)	3 (11.1%)		
Marital Status				
Never Married	107 (92.2%)	9 (7.8%)	1.9841	0.371
Currently Married	154 (93.9%)	10 (6.1%)		
Other marital status	23 (100.0%)	0 (0.0%)		
Area of Study				
Medicine	220 (94.8%)	12 (5.2%)	6.2286	0.183
Nursing	15 (100.0%)	0 (0.0%)		
Pharmacy	22 (84.6%)	4 (15.4%)		
Public Health	14 (87.5%)	2 (12.5%)		
Dentistry	13 (92.9%)	1 (7.1%)		

Sex was significantly associated with tobacco smoking where men were found to smoke tobacco more than women (p-value = 0.004). Age, marital status and area of study had no significant association with tobacco smoking (p-value=0.451, p-value=0.371, p-value=0.183 respectively)

4.3.2 Heavy Episodic Drinking

The strength of association of heavy episodic drinking and the predictor variables is shown in tables 4.9.

Table 4.9: Association of heavy episodic drinking with sex, age, marital status and area of study

Sex	Heavy Episodic Drinking		χ^2 value	p-value
	No	Yes		
Male	42 (53.2%)	37 (46.8%)	13.2029	<0.001
Female	31 (88.6%)	4 (11.4%)		
Age				
25 – 30	40 (66.7%)	20 (33.3%)	1.6835	0.431
31 – 35	26 (32.1%)	19 (67.9%)		
Above 35	7 (77.8%)	2 (22.2%)		
Marital Status				
Never Married	33 (64.7%)	18 (35.3%)	1.6722	0.433
Currently Married	36 (66.7%)	18 (33.3%)		
Other marital status	4 (44.4%)	5 (55.6%)		
Area of Study				
Medicine	58 (63.7%)	33 (36.3%)	0.7020	0.873
Nursing	4 (57.1%)	3 (42.9%)		
Pharmacy	7 (63.6%)	4 (36.4%)		
Dentistry	4 (80.0%)	1 (20.0%)		

Sex had a strong association with heavy episodic drinking where men were found to participate more than women (p-value = <0.001). No significant association was found between heavy episodic drinking with age, marital status and area of study (p-value=0.431, p-value=0.433, p-value=0.873 respectively)

4.3.3 Fruit and vegetable consumption

Strength of association of low fruit and vegetable consumption against the predictor variables is shown in tables 4.10.

Table 4.10: Association of low fruit and vegetable intake with sex, age, marital status and area of study

Sex	**Low Fruit and Vegetable Intake**		**χ^2 value**	**p-value**
	No	**Yes**		
Male	15 (8.6%)	159 (91.4%)	1.8096	0.179
Female	6 (4.7%)	123 (95.3%)		
Age				
25 – 30	6 (3.8%)	154 (96.2%)	8.6437	0.013
31 – 35	10 (8.6%)	106 (91.4%)		
Above 35	5 (18.5%)	22 (81.5%)		
Marital Status				
Never Married	7 (6.0%)	109 (94.0%)	0.2935	0.864
Currently Married	12 (7.3%)	152 (92.7%)		
Other marital status	2 (8.7%)	21 (91.3%)		
Area of Study				
Medicine	17 (6.8%)	215 (93.2%)	1.2741	0.866
Nursing	1 (6.7%)	14 (93.3%)		
Pharmacy	2 (7.7%)	24 (92.3%)		
Public Health	0 (0.0%)	16 (100.0%)		
Dentistry	1 (7.1%)	13 (92.9%)		

Age had a significant association with inadequate fruit and vegetable intake (p-value=0.013). There was no significant association between low fruit and vegetable intake with sex, marital status and area of study (p-value=0.179, p-value=0.864, p-value=0.886 respectively). It is interesting to note that all the participants from Public Health area of study recorded a low intake of fruit and vegetables.

4.3.4 Physical Activity

The strength of association of physical inactivity against the predictor variables is shown in tables 4.11.

Table 4.11: Association of inadequate physical activity with sex, age, marital status and area of study

Sex	Inadequate Physical Activity		χ^2 value	p-value
	No	**Yes**		
Male	121 (69.5%)	53 (30.5%)	0.4531	0.501
Female	85 (65.9%)	44 (34.1%)		
Age				
25 – 30	96 (53.5%)	33 (46.5%)	5.3912	0.068
31 – 35	82 (82.9%)	17 (17.1%)		
Above 35	18 (94.7%)	1 (5.3%)		
Marital Status				
Never Married	69 (71.1%)	28 (28.9%)	7.6294	0.022
Currently Married	111 (90.2%)	22 (9.8%)		
Other marital status	16 (94.1%)	1 (5.9%)		
Area of study				
Medicine	148 (78.3%)	41 (21.7%)	1.8242	0.768
Nursing	13 (92.9%)	1 (7.1%)		
Pharmacy	17 (77.3%)	5 (22.7%)		
Public Health	9 (81.8%)	2 (18.2%)		
Dentistry	9 (81.8%)	2 (18.2%)		

Marital status was found to be significantly associated with physical inactivity (p-value=0.022). No significant association was found between physical inactivity with age (p-value=0.068), sex (p-value=0.501) and area of study (p-value=0.768).

In summary, 3 of the 4 predictor variables were found to have significant association with the outcome variables. Sex was found to have a significant association with tobacco smoking and heavy episodic drinking; age had a significant association with inadequate fruit and vegetable consumption and marital status had significant association with physical inactivity.

4.4 Relationship of Behavioral Risk factors with Age, Sex, Marital status and Area of Study

The relationship between outcome variables and predictor variables was done using multiple logistic regression as the multivariable analysis method.

4.4.1 Tobacco Smoking

The relationship of tobacco smoking with the predictor variables is presented in table 4.12.

Table 4. 12: Relationship of tobacco smoking with sex, age, marital status and area of study

Factor	Current smoker (N=303)		OR (95% CI)	p-value
	N	n (%)		
Age				
25 - 30	160	8 (5.0)	1.00 (Ref)	
31 - 35	116	8 (6.9)	1.41 (0.51-3.87)	0.507
Above 35	27	3 (11.1)	2.38 (059-9.58)	0.224
Sex				
Male	174	17 (9.8)	1.00 (Ref)	
Female	129	2 (1.55)	0.15 (0.03-0.64)	0.011
Marital status				
Never married	116	9 (7.8)	1.00 (Ref)	
Currently married	164	10 (6.1)	0.77 (0.30-1.96)	0.587
Other marital status	23	0 (0)	-	-
Area of study				
Medicine	232	12 (5.2)	1.00 (Ref)	
Nursing	15	0 (0)	-	-
Pharmacy	26	4 (15.4)	3.33 (0.99-11.22)	0.052
Public health	16	2 (12.5)	2.62 (0.53-12.86)	0.236
Dentistry	14	1 (7.1)	1.52 (0.17-11.69)	0.750

Age, marital status and area of study had no significant relationship with tobacco smoking whereas sex had a significant relationship with tobacco smoking where women were less likely to smoke tobacco than men (p-value=0.011).

4.4.2 Heavy Episodic Drinking

The relationship of heavy episodic drinking with the predictor variables is shown in table 4.13.

Table 4.13: Relationship of heavy episodic drinking with sex, age, marital status and area of study

Factor	Heavy Episodic Drinking (N=114)		OR (95% CI)	p-value
	N	n (%)		
Age				
25 - 30	60	20 (33.3)	1.00 (Ref)	
31 - 35	45	19 (42.2)	1.46 (0.66-3.25)	0.352
Above 35	9	2 (22.2)	0.57 (0.11-3.01)	0.509
Sex				
Male	79	37 (46.8)	1.00 (Ref)	
Female	35	4 (11.4)	0.15 (0.05-0.45)	0.001
Marital status				
Never married	51	18 (35.3)	1.00 (Ref)	
Currently married	54	18 (33.3)	0.92 (0.41-2.05)	0.832
Other marital status	9	5 (55.6)	2.29 (0.55-9.62)	0.257
Area of study				
Medicine	91	33 (36.3)	1.00 (Ref)	
Pharmacy	7	3 (42.9)	1.32 (0.28-6.25)	0.728
Public Health	11	4 (36.4)	1.00 (0.27-3.69)	0.995
Dentistry	5	1 (20.0)	0.44 (0.05-4.10)	0.470

Age, marital status and area of study had no significant relationship with heavy episodic drinking unlike sex where women were less likely to participate in heavy episodic drinking (p-value=0.001).

4.4.3 Fruit and Vegetable Consumption

Multivariable analysis of low fruit and vegetable intake with the predictor variables is shown in table 4.14.

Table 4.14: Relationship of low fruit and vegetable intake with sex, age, marital status and area of study

Factor	Low fruit and vegetable intake (N=303)		OR (95% CI)	p-value
	N	n(%)		
Age				
25 - 30	160	154 (96.3)	1.00 (Ref)	
31 - 35	116	106 (91.4)	0.41 (0.15-1.17)	0.096
Above 35	27	22 (81.5)	0.17 (0.05-0.61)	0.006
Sex				
Male	174	159 (91.4)	1.00 (Ref)	
Female	129	123 (95.4)	1.93 (0.73-5.13)	0.185
Marital status				
Never married	116	109 (94.0)	1.00 (Ref)	
Currently married	164	152 (92.7)	0.81 (0.31-2.13)	0.675
Other marital status	23	21 (91.3)	0.67 (0.13-3.47)	0.638
Area of study				
Medicine	232	215 (92.7)	1.00 (Ref)	
Nursing	15	14 (93.3)	1.11 (0.14-8.93)	0.924
Pharmacy	26	24 (92.3)	0.95 (0.21-4.36)	0.946
Public health	16	16 (100)	-	-
Dentistry	14	13 (92.9)	1.10 (0.13-8.34)	0.979

Age group of above 35 years showed a significant relationship (p-value=0.006) with low fruit and vegetable intake however the other age group (31-35 years) had no significant relationship (p-value=0.096). The variable age therefore did not qualify to have significant association with low fruit and vegetable intake. Sex, marital status and area of study also did not have significant relationship with low fruit and vegetable intake.

4.4.4 Physical Activity

The relationship of physical inactivity with predictor variables is summarized in table 4.15.

Table 4.15: Relationship of inadequate physical activity with sex, age, marital status and area of study

Factor	Inadequate physical activity (N=303)		OR (95% CI)	p-value
	N	n(%)		
Age				
25 - 30	160	59 (36.9)	1.00 (Ref)	
31 - 35	116	29 (25.0)	0.57 (0.34-0.97)	0.038
Above 35	27	9 (33.3)	0.86 (0.36-203)	0.724
Sex				
Male	174	53 (30.5)	1.00 (Ref)	
Female	129	44 (34.1)	1.18 (0.73-1.92)	0.501
Marital status				
Never married	116	40 (34.5)	1.00 (Ref)	
Currently married	164	50 (30.5)	0.83 (0.50-1.38)	0.481
Other marital status	23	7 (30.4)	0.83 (0.32-2.19)	0.708
Area of study				
Medicine	232	77 (33.2)	1.00 (Ref)	
Nursing	15	1 (6.7)	0.14 (0.02-1.11)	0.063
Pharmacy	26	8 (30.8)	0.89 (0.37-2.15)	0.803
Public health	16	6 (37.5)	1.20 (0.42-3.45)	0.724
Dentistry	14	5 (35.7)	1.12 (0.36-3.45)	0.846

Sex, marital status and area of study were found not to be significantly related with physical inactivity. The age group 31 - 35 years showed significant association (p-value=0.038) with physical inactivity however the other age group (above 35 years) had no significant association (p-value=0.724). The variable age therefore did not qualify to have a significant relationship with physical inactivity.

Following multivariable analysis, sex was the only predictor variable that was found to have a significant relationship with outcome variables tobacco smoking and heavy episodic drinking.

4.5 Knowledge of published WHO guidelines on behavioral risk factors

Less than a third of study participants reported having a clear understanding of the WHO guidelines on each of the 4 behavioral risk factors that were the focus of this study.

Table 4.16 summarizes this by sex of participants.

Table 4.16: Self-reported knowledge of published WHO guidelines on behavioral risk factors

Behavioral Risk Factor	Participants with knowledge of WHO guidelines on behavioral risk factors	
	Number of Participants	% (95%CI)
*Tobacco use	64	21.3 (17.0, 26.2)
Alcohol use	74	24.4 (19.9, 29.6)
*Healthy Diet	78	25.7 (21.3, 31.1)
Physical activity	62	20.5 (16.3, 25.4)

*Does not include 2 records for tobacco use and 2 records for healthy diet

More than two thirds of participants (73.6%, n=224) did not have a clear understanding of the published WHO recommendations on healthy diet and approximately 79% (n=240) of the participants did not have a clear understanding of the published WHO guidelines on physical activity. Similarly, most of the participants (n=229, 75.2%) did not have a clear understanding of the published WHO guidelines on alcohol use. Seventy-eight percent (78%) of the participants did not have a clear understanding of published recommendations on tobacco use.

The strength of association for knowledge of published WHO guidelines on the 4 behavioral risk factors by sex is shown in table 4.17.

Table 4.17: Association of knowledge with sex of participants

Sex	Knowledge of the WHO guidelines on tobacco use		χ^2 value	p-value
	No	**Yes**		
Male	138 (79.3%)	36 (20.7%)	2.796	0.247
Female	99 (76.7%)	28 (23.3%)		
	Knowledge of the WHO guidelines on alcohol use			
	No	**Yes**		
Male	133 (76.4%)	41 (23.6%)	0.163	0.686
Female	96 (74.4%)	33 (25.6%)		
	Knowledge of the WHO guidelines on healthy diet			
	No	**Yes**		
Male	133 (76.4%)	41 (23.6%)	1.015	0.314
Female	90 (70.9%)	37 (29.1%)		
	Knowledge of the WHO guidelines on physical activity			
	No	**Yes**		
Male	139 (79.5%)	34 (19.5%)	0.935	0.627
Female	101 (78.3%)	28 (21.7%)		

There was no significant difference on the knowledge of WHO guidelines by sex for all the four behavioral risk factors. The p-value for the chi square test for participant's knowledge of published WHO guidelines on tobacco use, alcohol use, healthy diet and physical activity by sex were all higher than 0.05.

4.6 Participant's uptake of screening services for NCDs

The health seeking behaviour of the participants in terms of screening for NCDs in their lifetime was assessed. Table 4.18 summarizes these findings.

Table 4.18: Participant's uptake of NCDs' screening services

Screening Service	Female n=129 % (95%CI)	Both Sexes N=303 % (95%CI)
*Blood pressure	88.3% (80.8, 92.2)	85.7% (80.7, 88.7)
*Blood sugar screened	83.6% (75.5, 88.5)	77.4% (71.8, 81.3)
*Blood cholesterol	28.4% (20.9, 36.2)	28.3% (23.3, 33.4)
**Cervical cancer	62.3% (46.4, 63.4)	-

*****Does not include 2 records for blood pressure and blood sugar as well as 3 records for blood cholesterol.

**For women only and does not include 15 records.

More than four fifths of participants (n=258, 85.7%) had been screened for elevated blood pressure in their lifetime. Six percent (6%) of the participants had been diagnosed with elevated blood pressure and among these, 7 men and 2 women had been diagnosed in the prior 1 year to the study.

Approximately seventy-eight percent (n=233, 77.4%) of participants had been screened for elevated blood sugar in their lifetime with 2 men having been diagnosed with diabetes and 1 of them diagnosed in the 1 year prior to the study.

The majority of the participants (n=215, 71.9%) have never been screened for elevated blood cholesterol. Among those screened, 3 men and 2 women had ever been diagnosed with elevated cholesterol and 2 of the men were diagnosed 1 year prior to the study.

More than half of the female participants (n=71, 62.3%) had been screened for cancer of the cervix in their lifetime and among these, 32 of them had the screening done 1 year prior to the study.

The strength of association for screening service done by sex is shown in table 4.19.

Table 4.19: Association of screening service with sex

Sex	**Blood pressure**		χ^2 **value**	**p-value**
	No	**Yes**		
Male	28 (16.2%)	145 (83.8%)	1.243	0.537
Female	15 (11.7%)	113 (88.3%)		
	Blood sugar			
	No	**Yes**		
Male	47 (27.2%)	126 (72.8%)	4.916	0.086
Female	21 (16.4%)	107 (83.6%)		
	Blood cholesterol			
	No	**Yes**		
Male	124 (71.3%)	49 (28.2%)	0.719	0.698
Female	91 (70.5%)	36 (27.9%)		

There was no significant sex difference in uptake of screening services for selected NCDs among the participants in the study. The p-value for the chi square test for the screening of blood pressure, blood sugar and blood cholesterol by sex were all higher than 0.05.

CHAPTER 5: DISCUSSION

This was a cross-sectional study carried out among postgraduate students of the College of Health Sciences in the University of Nairobi and it is the first survey on the behavioral risk factors for NCDs among this population. Previous surveys based on the WHO STEPS tool in Kenya have been conducted as a community survey in Kibera slum Nairobi, as a hospital based study in Mombasa and among undergraduate students at the University of Nairobi.

Tobacco use was found to be low among the participants who reported current use of tobacco and all of them reported use of cigarettes. This prevalence is slightly lower than local findings by NACADA in their national tobacco use prevalence survey published in the year 2012. A more recent community survey by Ayah and colleagues (2013) conducted in Kibera slum Nairobi, reported a tobacco use prevalence that was higher than the national prevalence. The lower prevalence recorded in this study could be attributed to the education level as well as nature of occupation of the participants, majority of whom were postgraduate students and practicing HCWs.

This study's tobacco use prevalence is similar to that of medical undergraduate students in India. Men were found to be significantly more than women in tobacco use, a finding that was consistent in the local, regional and international studies. Despite the low prevalence of tobacco use among Kenyans and Kenya's adoption of the FCTC and implementation of the tobacco control act, the majority of the participants did not have a clear understanding of the WHO recommendations on tobacco use. This demonstrates a huge gap in the Ministry of Health's in-service training of health workers where policies concerned

directly with health are still unfamiliar to the frontline HCWs who are supposedly to be their primary advocates.

Less than half of the participants were current alcohol users though more than half of participants reported some alcohol use in their lifetime. This prevalence is lower than the one reported the community survey by Ayah and colleagues (2013) who reported current alcohol use among Kibera slum residents to be more than two thirds of their participants. It is however higher than the national prevalence of less than a third of their respondents reported by NACADA published in 2012 with Nairobi specifically reporting a prevalence of slightly higher than a fifth of the respondents. Tanzania reported a national prevalence of almost a third of the respondents in the year 2011.

The difference in the reporting could be due to the fact that persons of low socio-economic status such as slum dwellers and urban dwellers are known to abuse substances such as alcohol and tobacco more than their counterparts (NACADA 2012). All the study participants were urban dwellers as they attended full time learning at University of Nairobi and likely resided and worked in better environment than the Kibera study participants. Less women than men were current alcohol users, had a history of heavy episodic drinking and they consumed less volume of alcohol in line with local and regional findings. The minority of the current alcohol users reported a history heavy episodic drinking and none of them recorded features of alcohol dependence on the data collection tool.

As with tobacco, majority of the participants did not have a clear understanding of the WHO recommendations on alcohol use. This suggests a limitation on the quality of health education on tobacco and alcohol use that these health workers would give to their clients as they provide health services. The UK based National Institute for Health and Care Excellence (NICE) has published 12 recommendations for addressing harmful alcohol use. Kenya's Alcoholic Drinks Control Act of 2010 resonates with some of these recommendations however some are not enforced such as restricted marketing, screening of adults and young persons for alcohol related disorders, targeted interventions for screened individuals and referral of screened individuals for specialized treatment. These are areas that provide opportunity for policy interventions that will reinforce the control measure already instituted by the act of parliament.

The greater number of participants in this study reported adequate levels of physical activity based on the WHO recommendations of at least 600 MET-minutes per week for adults. It is interesting to note that most participants did not partake in vigorous or moderate intensity activity for work nor leisure. However, majority walked or cycled for more than 10 minutes at a time in their travel from place to place. The duration of sedentary behaviour per day reported was the longest when compared to duration of work, recreation or walking activity among participants in this study. This finding therefore presents opportunity for a further improvement in the number of those achieving adequate physical activity through work or recreation activities as well as reducing the sedentary behaviour in this population by encouraging and providing opportunities at the workplace and home environment.

Local and regional studies have reported similar findings on physical activity though the findings in this study (prevalence of adequate physical activity 68%) are lower than the Kibera community based survey which reported a prevalence of 75.7%. Tanzania and Zanzibar recorded prevalence of adequate levels of physical 92.5% and 82.4% respectively in their national surveys. However, studies conducted among university medical students in India, Saudi Arabia and South Africa reported a low prevalence in adequate physical activity. These studies were carried out among undergraduate students who are likely accommodated in school and primarily attend lectures most of the day unlike the postgraduate students who attend lectures, care for patients and travel to and from home. A small proportion of participants had knowledge of the published WHO guidelines on physical activity for adults, a finding that demonstrates an opportunity to educate HCWs undergoing postgraduate training on physical activity for health promotion for their own consumption as well as dissemination to the general population.

An unhealthy diet was recorded as the most prominent risk factor prevalent in this study, more so among men than women. Almost all the participants reported low levels fruit and vegetable consumption per day. This is in line with findings reported in studies conducted among university students in India, Saudi Arabia and South Africa as well as regional findings where both Tanzania and Zanzibar reported a national prevalence of low fruit and vegetable intake. There was no significant sex difference in those studies. In this study, the low intake of fruit and vegetables was homogenous throughout the sample as inferential analysis did not yield any significant associations with the predictor variables. This suggests that it is a generalized practice that does depend on person factors. Qualitative studies carried out to investigate this dietary practice are likely to give a more in-depth explanation to this finding. Other unhealthy dietary practices were recorded and

these included preferential consumption of unhealthy oils, red meat and organ meat which put the participant at risk of developing NCDs due to the high level of saturated fats. The greater majority of the participants failed to use healthy oils in their household cooking. This majority reported use of vegetable oil that is not specified by manufacturer (which stood out as the most popular) as well as butter/ghee, margarine and lard as their household cooking oil. The respondents who recorded "none in particular" were also included in the unhealthy oil category as they represented individuals who did not make informed choices on their cooking oil. The minority who used healthy oils recorded olive oil, sunflower oil and corn oil as their choices. One respondent recorded not using any oil in cooking. The cooking oils marketed as vegetable oil in Kenya predominantly constitute palm oil which was confirmed by a spot-check conducted in the markets of Nairobi.

The WHO advices individuals to minimize their intake of saturated fats although recent studies published report that intake of saturated fats pose no risk for development of cardiovascular disease unlike trans-fats which are associated with CVD morbidity and mortality.

Another unhealthy dietary practice reported by participants was consumption of simple starches predominantly in their household. The simple starches contain higher content of free sugars which put individuals at risk of developing obesity as well as making blood sugar control a challenge in diabetics. They also contain low content of fiber which deprives the individuals of the benefits of dietary fiber which include provision of some micro-nutrients, longer satiety duration and protection from some cancers. Most of the participants in this study reported consumption of simple starches in their households.

The minority of the participants consumed more than 5 meals per week away from home. This reflected on the number of meals consumed that the individual had little control over the choice of ingredients and cooking methods. Those who consumed more than 5 meals per week suggested that they consumed meals external from more than once a day and/or more than 5 days a week. These presumably commercially prepared meals would likely expose these individuals to intake of unhealthy oils, inadequate vegetables and simple starches. Such individuals would be at higher risk of developing NCDs than those who consumed most of their meals at home where they had control of the ingredients and cooking methods.

This finding of high saturated oils intake and low dietary fiber intake coupled with a low level of knowledge on the WHO dietary guidelines reported by our respondents who are HCW places them at a risk of developing NCDs as well as rendering them incompetent in giving appropriate health promoting dietary advice to the general population. Additionally, this study has demonstrated a potential risk of overweight and obesity among the postgraduate students due to the unhealthy dietary habits coupled with physical inactivity. The WHO has identified these two factors as major contributors to obesity which in turn is a major risk factor for several NCDs such as cardiovascular diseases, diabetes and some cancers. Artaud and colleagues (2013) found in their cohort study carried out in France that behaviors of unhealthy diet, physical inactivity and smoking had a significant association with development of disability in old age. This association was found with each factor individually and in combination there was a cumulative effect on

the risk (Artaud et al. 2013). There is therefore risk for adverse outcomes for the postgraduate students with these behaviors in the short term and later in life.

The 57th World Health Assembly endorsed and adopted the Global strategy on Diet and Physical Activity for Health in 2002. They urged health ministries to develop national strategies and thereafter coordinate the multi-sectoral effort of implementing the strategy. Kenya's Ministry of Health has not yet developed a national strategy specific on diet or physical activity but has recently published the Kenya National Strategy for the Prevention and Control of NCDs 2015-2020. This document details out 10 strategies that the ministry will undertake in order to raise awareness of the NCD burden, formulate legislations and policies to mitigate NCDs burden, coordinate national and county government efforts, conduct research and promote local and international partnerships in the arena of NCDs prevention and control.

The study evaluated uptake of screening services for selected NCDs among the participants in their lifetime. The majority of the participants had been screened for elevated blood pressure and blood sugar with more than half of the women having been screened for cervical cancer at least once in their lifetime. However almost two thirds of the participants had never been screened for elevated cholesterol which demonstrates a non-uniform uptake of screening services. Moreover, this finding had no significant sex difference and this suggests a trend where the more invasive the screening procedure, the less it is utilized. Qualitative studies investigating the reasons behind the incomplete as well the variable uptake in screening services for selected NCDs would shed more light on why not all postgraduate students undergo screening for disease.

CONCLUSION

The postgraduate students at the College of Health Sciences, UoN are exposed to behavioral risk factors for NCDs with unhealthy diet being the most prevalent behavioral risk factor in this study. Male postgraduate students are more at risk of tobacco use and harmful alcohol use than the female postgraduate students. The postgraduate students who are practicing HCWs exhibit a limited capacity to protect themselves from developing NCDs as well to adequately counsel their clients on health promoting behaviors due to their low level of knowledge of the published WHO guidelines on the four behavioral risk factors. It is apparent that some postgraduate students practice less than optimal health seeking behaviour as they do not undergo complete screening for NCDs despite being practicing HCWs.

The results from this study suggest that there is a gap in the mentoring, training and capacity building of health care oriented postgraduate students both pre-service and in-service. This gap is prominent in the area of NCDs prevention practices and health promoting behaviours which may be a contributory factor to the high NCDs burden being experienced in the country. Establishing the reasons for the behaviour of the postgraduate students elicited by this study is crucial to the development of NCDs prevention and control strategies for postgraduate students and other university students.

This study raised the awareness of some participants on their exposure to behavioral risk factors at the time of data collection and the findings have demonstrated that interventions designed for preventing NCDs need to take into consideration the health condition of the implementers as well as their preparedness to deliver quality health care.

RECOMMENDATIONS

Based on the study objectives and findings, it is recommended that the UoN and MoH should conduct further studies that will examine the factors contributing to postgraduate students, who are practicing HCWs being exposed to NCDs risk factors. The UoN faculty should also investigate why the male postgraduate students are more at risk of tobacco use and harmful alcohol use than women.

The MoH in collaboration with UoN should conduct intensive sensitization for all postgraduate students on the published WHO recommendations on NCDs risk factor prevention strategies. It is also recommended that a robust program for NCDs screening services should be developed jointly by MoH and the UoN targeting the postgraduate students and investigate with further studies the reasons for their variable uptake of screening services.

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Appendix 1: Consent Form

Informed consent

My name is Dr. Loise Nyanjau Ndonga, an MPH student from University Nairobi. I am conducting a study on Prevalence of Behavioral Risk Factors for NCDs among postgraduate students in the college of health sciences at university of Nairobi. The information will be used by Ministry of Health, Ministry of Education, training institutions and general public to prevent chronic diseases and promote health.

Procedures

Participation in this study will require I ask you some questions on your lifestyle. Information will be recorded in a questionnaire. You have the right to refuse participation in the study. You may ask questions related to the study at any time. You may refuse to respond to any questions and you may stop participating at any time without consequences you.

Discomforts and risks

Some questions you will be asked will be of a personal nature and may make you uncomfortable. If this happens you may refuse to answer if you so choose. You may also stop the interview at any time. Participation may consume approximately 10 of your time.

Benefits and Reward

Your participation in the study will help us learn how to promote health service provision and prevent chronic diseases. There will be no reward to participate in the study.

Confidentiality

Your name will not be recorded in the questionnaire. The questionnaire will be kept in a locked cabinet for safe keeping and everything will be kept private.

Contact information

If you have any questions you may contact Loise Nyanjau Ndonga on 0720986385 or Mr. Erastus Njeru (School of Public health, UoN), Dr. Rose Opiyo (School of Public health, UoN) or KNH/UoN Ethical Review Committee Secretariat.

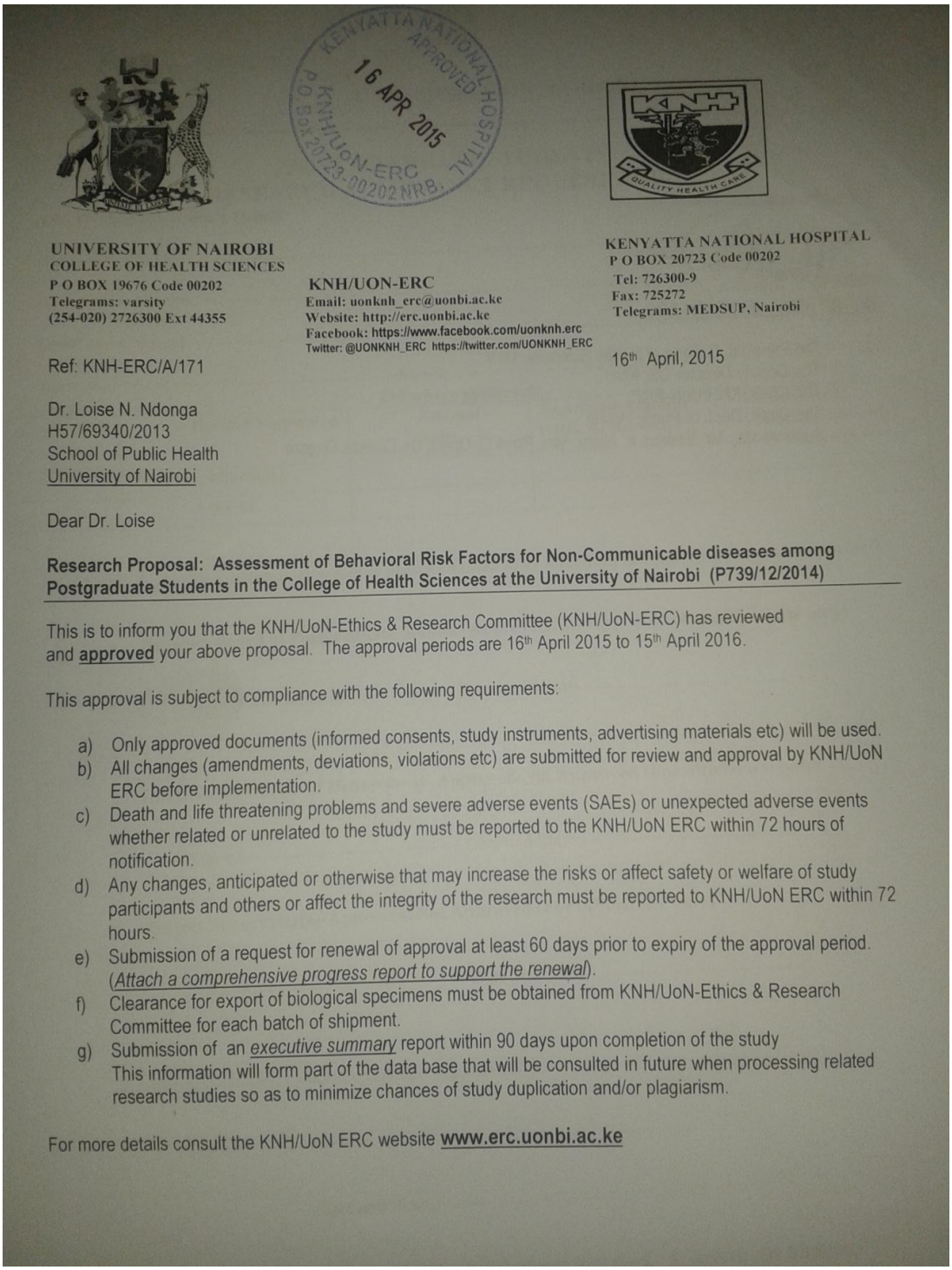
Participants statement

The above information regarding my participation is clear to me. I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that my records will be kept private and that I can leave the study at any time.

Name of participant_____

Signature _____ Date_____

Appendix 2: Ethics Review Committee Approval



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16th April, 2015

Dr. Loise N. Ndonga
H57/69340/2013
School of Public Health
University of Nairobi

Dear Dr. Loise

Research Proposal: Assessment of Behavioral Risk Factors for Non-Communicable diseases among Postgraduate Students in the College of Health Sciences at the University of Nairobi (P739/12/2014)

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and **approved** your above proposal. The approval periods are 16th April 2015 to 15th April 2016.

This approval is subject to compliance with the following requirements:

a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
g) Submission of an *executive summary* report within 90 days upon completion of the study This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN ERC website **www.erc.uonbi.ac.ke**

Appendix 3 : Questionnaire