SOCIO-DEMOGRAPHIC, LIFESTYLE AND PSYCHO-SOCIAL FACTORS ASSOCIATED WITH OVERWEIGHT AND OBESITY AMONG HEALTH CARE WORKERS IN KISUMU EAST SUB-COUNTY, KENYA.

BY

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DECLARATION

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

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DEDICATION

To my loving wife Phanice Masimba

To my lovely daughter Neema Masimba

To my son Jabali Masimba

To my dear father Johnson Masimba

To my dear mother Rhodah Masimba

ABSTRACT

Over 2.8 million deaths annually and 35.8 million (2.3%) of global Disability Adjusted Life Years are attributed to overweight, making it the fifth leading risk for global deaths. In Kenya, 23.1% of the population is estimated to be either overweight or obese and the problem is rapidly increasing. Even though healthcare workers are a group considered well informed of aetiology of overweight/obesity, they have been reported to be disproportionately affected by the same problem. However, the problem and its associated factors among healthcare workers in Kenya and Kisumu East in particular remain un-investigated. The aim of this study was to determine socio-demographic, lifestyle and psycho-social factors associated with overweight/obesity among healthcare workers in Kisumu East subcounty. Analytical cross-sectional design was adopted for this study. Data was collected using questionnaires, electronic weighing scale (SECA 876) and height measuring bar. Body Mass Index was classified using World Health Organization guidelines. A total of 165 out of a population of 783 healthcare workers were sampled from 9 health facilities proportionate to population size, at each facility respondents were selected by systematic random sampling. Females comprised 65.5% and males 34.5%, mean age was 37.1 years. Among the respondents, 58.8% were either overweight or obese. Socio-demographic factors associated with overweight/obesity were gender, age and marital status ($p < 0.05$). Religion, socio-economic status, residence, parity and family obesity history were not associated with overweight/obesity ($p>0.05$). Vigorous physical activity was the only lifestyle factor associated with overweight/obesity ($p < 0.05$), other factors namely, moderate physical activity, walking to places, number of hours spent sitting per day, alcohol intake, hours of sleep per day and night shift work were not associated with overweight/obesity ($p>0.05$). Psycho-social factors namely perceived Body Mass Index status and satisfaction with own body weight were significantly associated with overweight/obesity ($p < 0.05$), however stress level was not ($p>0.05$). In logistic regression analysis, age was the only independent predictor as respondents of age 40-49 were seven times more likely to be overweight or obese compared to those below 30 years OR (95% CI) = 7.3(2.0-25.98) $p = 0.002$ ($p<0.05$). Given that age was the only independent predictor of overweight/obesity, there is need to implement overweight/obesity prevention and control interventions among healthcare workers particularly among those above 40 years and sensitize them on the importance of awareness of one's own body weight.

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LIST OF ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
BIA	Bioelectrical Impedance Analysis
BMI	Body Mass Index
CBS	Central Bureau of Statistics
CVD	Cardiovascular Disease
DALYS	Disability Adjusted Life Years
GPAQ	Global Physical Activity Questionnaire
HIV	Human Immunodeficiency Virus
ICF	Inner City Fund
JOOTRH	Jaramogi Oginga Odinga Teaching and Referral Hospital
KDHS	Kenya Demographic and Health Survey
KNBS	Kenya National Bureau of Statistics
KNDS	Kenya National Diabetes Strategy
NACADA	National Campaign Against Drug Abuse
NCDs	Non Communicable Diseases
SCMOH	Sub-County Medical Officer of Health
SPSS	Statistical Package for Social Scientists
USA	United States of America
WHO	World Health Organization
WHR	Waist Hip Ratio

DEFINITION OF KEY TERMS

Age: The length of time in years that a respondent has lived.

Alcohol intake: Consumption of any beverage with ethyl alcohol as a component.

BMI Status: An anthropometric measure derived from a person's weight in kilograms divided by his or her height in meters squared.

Body size perception: The subjective way a respondent thinks about, recognizes, or classifies his/her body size as normal, overweight or obese.

Family history of overweight: Indication whether there is or there is not a nuclear family member with overweight or obesity.

Health Care Worker: Person working in a health facility who must have attended a higher learning institution recognized by the government of Kenya and obtained a degree, higher national diploma, diploma or certificate qualification in any of the following field: Medicine and surgery, nursing, pharmacy, dentistry, environmental health, clinical medicine, laboratory technology, nutrition, radiography, occupational therapy, physiotherapy and medical social work.

Lifetime stress: Perceived state of mental or emotional strain or tension resulting from adverse or demanding circumstances.

Marital status: The condition of being married or unmarried.

Normal weight: Body mass index of 18.5 kg/m^2 - 24.9 kg/m^2

Obesity: Body Mass Index equal to or greater than 30 kg/m^2.

Overweight: Body Mass Index equal to or more than 25.0 kg/m^2.

Parity: Number of children a female respondent has had.

Physical activity: Any bodily movement produced by skeletal muscles that requires energy expenditure.

Psycho-social factors: Variables related to the interaction between social and psychological factors. In this study, psycho-social variables were lifetime stress, perception of own body weight and satisfaction with own body weight

Religion: The denomination whose beliefs, doctrines and teachings a respondent ascribes to.

Residence: Classification of the area in which a respondent lives, either urban or rural according to applicable local legislation.

Satisfaction with own body weight: Confident acceptance of one's body weight

Sedentary lifestyle: A type of lifestyle with no or irregular physical activity.

Sex: Gender of a respondent.

Shift work: Work done outside normal hours of work (8AM - 5PM).

Sleep time: Length of time in hours spent sleeping in a typical day.

Smoking: Inhalation of the smoke of burning tobacco encased in cigarettes, pipes or cigars.

Socio-demographic factors: Variables that depict sociological and demographic characteristics of healthcare workers. In this study, this referred to age, sex, socio-economic status, parity, marital status and family history of overweight.

Socio-economic status: An economic and sociological combined total measure of a respondent based on income, education and occupation.

Standard alcoholic drink: One standard alcoholic drink is equivalent to 1 standard bottle of regular beer -300ml or 1 single measure of spirits - 30ml or 1 medium size glass of wine – 120 ml

Underweight: Body Mass Index of less than 18.5 kg/m^2

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Globally, overweight and obesity is one of the most serious public health problem in the 21st century (Barness, Opitz, & Gilbert-Barness, 2007). In the year 1997, overweight/obesity was formally recognized as a chronic disease and an epidemic (W.H.O, 1997). Not only is it a chronic disease, it is also a well-recognized risk factor for non-communicable diseases such as cardiovascular diseases, hypertension, musculo-skeletal disorders, heart and cancers of several body organs. The global prevalence rate of overweight more than doubled between 1980 and 2000 and in the year 2014, 39% of adults aged 18 and over were overweight or obese (W.H.O, 2015).

According to the WHO, the Americas record the highest prevalence of overweight/obesity at 62% (W.H.O, 2014b). In Sub Saharan, the continent is now grappling with an increasing problem of overweight/obesity. In Mauritius, prevalence of overweight among adults aged 27 – 74 years increased over a five-year period from 3.4% in 1987 to 5.3% in 1992 (Hodge *et al*., 1996). In Nigeria, prevalence rate of overweight and obesity was reported to be 27% and 17% respectively (Gezawa *et al*., 2013) while a study in Tanzania among adult residents of a peri-urban area reported overweight prevalence of 43% (Shayo & Mugusi, 2011). The WHO estimated crude prevalence rate of overweight and obesity in Kenya to be 23.1% in the year 2014 (W.H.O, 2014a). A study done in Kombewa, Kisumu East subcounty reported that 14.2% of adults were either overweight or obese (Jayne, Scrimgeour, Polhemus, Otieno, & Bovill, 2011). Notably, this study was conducted in the general population hence its results cannot be generalized to healthcare workers who work in the subcounty.

Even though healthcare workers are considered a group well informed of etiology and health risks of overweight and obesity, they have been reported to be disproportionately affected by the same problem. A study conducted in USA, reported that Body Mass Index in all cadres of healthcare workers increased between the years 1982 and 2004 (Chou & Johnson, 2008). In Mexico, 52% and 23% of female and male healthcare workers respectively were reported to be overweight (Gonzalez-Velazquez & Mendez, 2007). In South Africa, one study of healthcare workers reported an overweight/obesity prevalence rate of 73% (Supa & Linda, 2011), while in Nigeria, overweight/obesity prevalence rate among healthcare workers was found to be 72% (Iwuala *et al*., 2015). In all these studies, overweight/obesity prevalence rates among them were higher than the national prevalence rates as estimated by the World health Organization (W.H.O, 2014b). In addition, all the studies were conducted in one health facility, which therefore restricts generalization of their findings. In Kenya, the problem of overweight and obesity among Kenyan healthcare workers remain uninvestigated.

Development of overweight and obesity is facilitated by social, environmental, biological and genetic factors that either collectively or independently affect weight gain through the mediators of energy intake and expenditure in the body (Ebbeling, Pawlak, & Ludwig, 2002). The World Health Organization (WHO) has consequently advocated for a broad based public health approach to develop population based strategies for prevention of overweight/obesity (W.H.O, 2000). The strategies can only be most effective if they are informed by research evidence. Epidemiological investigations on the association between socio-demographic, lifestyle and psycho-social factors and

overweight/obesity are critical in holistically understanding and responding to the problem of overweight/obesity.

In some population surveys, socio-demographic factors such as gender, age, residence, marital status (Letamo, 2010) parity, socio-economic status (Shayo & Mugusi, 2011) and religion (K. H. Kim, Sobal, & Wethington, 2003) have been associated with overweight and obesity. Among the Kenyan healthcare workers, there is limited evidence as to which particular demographic characteristics are associated with overweight/obesity. Similarly, physical inactivity, a lifestyle factor largely attributed to the surge of overweight has been associated with the problem in some sections of the population in Kenya (Mbochi, Kuria, Kimiywe, Ochola, & Steyn, 2012; Okeyo, Ayado, & Mbagaya, 2009). Studies conducted elsewhere have in addition investigated the link between overweight/obesity and other lifestyle factors such as alcohol intake, smoking, (Erem *et al*., 2004), inadequate sleep (Vargas, 2016), and night shift work (Zhao, Bogossian, & Turner, 2012). In Kenya, the association between these lifestyle factors has not only received inadequate research attention at population level, but also among healthcare workers. An association between overweight/obesity and psycho-social determinants such as perceived body weight status (Ettarh, Van de Vijver, Oti, & Kyobutungi, 2013), stress level (Holmes, Ekkekakis, & Eisenmann, 2010) and satisfaction with own body weight status (Anderson, Eyler, Galuska, Brown, & Brownson, 2002b) among the Kenyan healthcare workforce also remain uninvestigated. To effectively address the problem of overweight and obesity among healthcare workers, there is need to investigate and document its determinants within this group of workers. Therefore, this study sought to investigate socio-demographic, lifestyle and psycho-social factors associated with overweight and obesity among Kenyan healthcare workers in Kisumu East Subcounty.

1.2 Statement of the Problem

Overweight/obesity is no longer a problem of developed nations, Sub-Saharan African countries are experiencing a surge in proportion of overweight/obese persons in the population. This has been largely attributed to sedentary lifestyle associated with rapid urbanization. Various studies conducted in Kenya have reported an increasing prevalence of overweight. The prevalence of overweight/obesity is not uniformly spread in the general population, healthcare workers are a group disproportionately affected by the problem even though they are a group well informed about aetiology and risks of overweight and obesity. In Kenya generally, and Kisumu East subcounty particularly, the problem of overweight and obesity among healthcare workers has not been investigated. During study site visits, some healthcare workers in the subcounty were observed to be visibly overweight or obese. However, such an observation is inherently subjective, thus it necessitates objective measurements and subsequent quantification of the problem and its associated socio-demographic, lifestyle and psycho-social factors. Lack of documented evidence on the problem of overweight and its associated risk factors among healthcare workers is worrying as the problem may escalate together with its co-morbidities unrecognized. Little attention is given to prevention and control of overweight/obesity in the country due to lack of comprehensive research to inform design and implementation of appropriate and targeted overweight prevention programs. Therefore, the aim of this study was to document predictors of overweight/obesity among healthcare workers in Kisumu East subcounty.

1.3 Justification of the Study

This study adds to the evidence base required in prevention and control of the growing problem of overweight in Kenya, especially among healthcare workers. Particularly, this study will generate

baseline data to bridge the gap of knowledge in the socio-demographic, lifestyle and psycho-social factors determinants of overweight and obesity among healthcare workers in Kisumu East Sub-county.

Kisumu City, the third largest urban area in Kenya (Kisumu city) is found within Kisumu East Sub-county. The Sub-county has public health facilities representing all the 4 tiers of health service delivery. As such, there are healthcare workers from all cadres working in these health facilities. Furthermore, some health facilities are situated within an urban area, others in peri-urban and others in rural areas. Therefore, this will enhance external validity of this study.

Diet and physical activity, as important factors for obesity, have been intensively studied previously based on the traditional concept of energy imbalance (Holmes *et al*., 2010). This study addressed other risk factors that have not been addressed sufficiently in previous studies within Kenya such as religion, inadequate sleep, stress, night shift work and psycho-social factors. In the country, Body Mass Index (BMI) has mainly been used in population surveys to determine overweight. In the current study, both BMI and Bioelectrical Impedance Analysis (BIA) was used to determine overweight/obesity. Unlike BMI, BIA can differentiate between lean mass and fat mass.

1.4. Significance of the Study

The study findings could form the basis of designing and implementing appropriate and targeted overweight prevention and control interventions among the healthcare workforce by the Ministry of Health. This could result in the reduction in prevalence of overweight/obesity among the healthcare workers in Kisumu East subcounty.

1.5 Broad Objective

To determine socio-demographic, lifestyle and psycho-social factors associated with overweight and obesity among health care workers in Kisumu East Subcounty, Kenya.

1.6 Specific Objectives

1.6.1 To assess socio-demographic factors associated with overweight and obesity among healthcare workers in Kisumu East subcounty.

1.6.2 To find out lifestyle factors associated with overweight and obesity among healthcare workers in Kisumu East subcounty.

1.6.3 To establish psycho-social factors associated with overweight and obesity among healthcare workers in Kisumu East subcounty.

1.7 Hypotheses

The following hypotheses were tested

1.7.1 There is no association between socio-demographic factors and overweight/obesity among healthcare workers in Kisumu East subcounty.

1.7.2 There is no association between lifestyle factors and overweight/obesity among healthcare workers in Kisumu East subcounty.

1.7.3 There is no association between psycho-social factors and overweight/obesity among healthcare workers in Kisumu East subcounty.

1.8 Limitation of the Study

Self-administered questionnaires were used in this study, as such respondents' responses could be prone to recall bias.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of some of the studies that have been conducted on the subject matter of this study. This section presents a general overview, definition and determination of overweight and obesity followed by the disease burden and prevalence globally, regionally and locally. Thereafter, factors associated with overweight/obesity are reviewed and finally a conceptual framework is outlined.

2.2 Overweight and Obesity Definition and Measurements

The World Health Organization (WHO) defines overweight/obesity as abnormal or excessive fat accumulation in the body that may impair health. This excessive fat is a consequence of energy imbalance whereby energy intake exceeds energy expenditure over a considerable period of time. Its development is aided by the interaction between social, behavioral, cultural, physiological, metabolic, and genetic factors (W.H.O, 1997). It is on this basis that this study sought to determine socio-demographic, lifestyle and psycho-social factors associated with overweight and obesity among healthcare workers in Kisumu East subcounty.

There are various methods of determining overweight and obesity, which range from simple taking of anthropometric measurements to complex body size and composition determination using complex machines. Simple anthropometric measurements include Body Mass Index (BMI), waist circumference, waist hip ratio, and skin fold thickness (W.H.O, 1997). Some of the complex methods to determine body size composition include Dual Energy X-ray Absorptiometry

(Pietrobelli, Wang, Formica, & Heymsfield, 1998), Computed Tomography (S. Kim *et al*., 1999), Magnetic Resonance Imaging (Ludescher *et al*., 2009), Air-Displacement Plethysmography (Temple, Denis, Walsh, Dicker, & Byrne, 2014), Isotope Dilution Analysis (Liu *et al*., 2008) and Bioelectrical Impedance Analysis (Langer *et al*., 2016). Assessment of overweight and obesity in this study was conducted using the BMI method for various reasons.

BMI provides the most useful population-level classification of body weight as it is the same for both sexes and for all ages of adults. Adult's BMI is classified into three major categories: BMI below 18.5 kg/m^2 is classified as underweight, 18.5-24.9 kg/m^2 is normal range, 25.0 kg/m^2 and above is overweight. The overweight category is further subdivided into 4 subcategories namely preobese (25.0 – 29.9 kg/m^2), Obese class I (30.0 – 34.9), obese class II (35.0 – 39.9 kg/m^2) and obese class III (40.0 and above) (W.H.O, 1997). BMI is also a consistent predictor of morbidity and mortality associated with chronic diseases (Zhou, 2002). It is the most widely used method in epidemiologic population surveys, mainly because it is inexpensive, readily available, easy to measure and interpret. As such, data with respect to body weight status in each country has been estimated by WHO (2014) using BMI measurements. Likewise, the USA Center for Diseases Control and Prevention (CDC) in its official website states that it prefers BMI over other methods in determining overweight/obesity in the population because the other methods are not always readily available, and they are either expensive or need highly trained personnel. Furthermore, many of these methods can be difficult to standardize across observers or machines, complicating comparisons across studies and time periods (CDC, 2016). Therefore, BMI method was adopted for this study.

2.3 Disease Burden and Epidemiology of Overweight and Obesity

Overweight/obesity has become one of the most serious global health concern and leading cause of otherwise preventable deaths. WHO Expert Consultation on overweight held in 1997 formally recognized it as an epidemic and warned that non-communicable diseases in many countries are likely to increase due to the epidemic (W.H.O, 1997). In 2014, more than 1.9 billion adults, 18 years and older, were either overweight or obese. Furthermore, at least 2.8 million people die each year as a result of being overweight, and an estimated 35.8 million (2.3%) of global DALYs are caused by overweight making it the fifth leading risk for global deaths (W.H.O, 2015). In most countries, prevalence of overweight is between 15 and 60%, with women being more likely to be overweight than men (James, Leach, Kalamara, & Shayeghi, 2001). According to the Global Health Observatory statistics, the Americas record the highest prevalence of overweight/obesity at 62% (W.H.O, 2014b).

In Sub Saharan Africa, public health has focused more on infectious diseases which constitute a higher disease burden, however the continent is now grappling with a double burden of increasing prevalence rates of overweight/obesity in adults amidst upsurge of malnutrition in children (Wojcicki, 2014). The increasing prevalence of overweight and obesity is a trend typical of many countries in Africa undergoing epidemiological transition (Santosa & Byass, 2016). Indeed, studies conducted in the African countries have consistently reported an upward trend in overweight and obesity across the entire population. A study conducted in Mauritius to investigate incidence and prevalence of overweight trends among adults aged 27 – 74 years reported an increase in obesity prevalence over a five-year period from 3.4% in 1987 to 5.3% in 1992 (Hodge *et al*., 1996). In one study conducted among residents of a city in north eastern Nigeria, prevalence rate of overweight and obesity was reported to be 27% and 17% respectively (Gezawa *et al*., 2013). A study conducted

in Tanzania among adult residents of a peri-urban area reported overweight prevalence of 43% (Shayo & Mugusi, 2011). The Kenya National Diabetes Strategy (KNDS) 2010 – 2015 noted that the problem of overweight and obesity is rapidly increasing in the country (MoPHS, 2010). This is corroborated by findings of Kenya Demographic and Health Surveys (KDHS). Results from the KDHS of 2003 reported that 23.4% of women and were overweight or obese (CBS, 2004), the proportion rose to 25.1% in the KDHS of 2008 (KNBS, 2010a). According to data from the WHO's Global Health Observatory Data Repository, the crude prevalence rate of overweight and obesity in Kenya was estimated to be 23.1% in the year 2014 (W.H.O, 2014a). Even though both the demographic and health surveys of 2003 and 2008 assessed prevalence of overweight and obesity among women only, the increase in prevalence among women within the span of 5 years mirrors an upward trajectory in overweight and obesity across the Kenyan population.

Other studies investigating the problem of overweight/obesity in Kenya have however reported mixed results. In Nairobi, overweight prevalence among informal settlement residents has been found to be 43.4% and 17.3% among women and men respectively (Ettarh *et al*., 2013) whereas a study done in Kombewa, Kisumu East subcounty reported that 14.2% of adults were either overweight or obese (Jayne *et al*., 2011). Among healthcare workers in Kenya, overweight and obesity has not been investigated, therefore it is not possible to quantify the problem and its associated determinants. This study sought to address this knowledge gap.

In the population level, there are marked differences in overweight/obesity prevalence between different subgroups, partly due to variation in distribution of risk factors. Persons in middle to high income brackets tend to have higher prevalence of overweight/obesity. There is growing research

interest in such groups. For example, in one study conducted in Kenya among lecturers of Nairobi University, overerweight and obesity prevalence rate of 42.5% was reported (Omondi, Othuon, & Mbagaya, 2007). In this study, 90% of respondents were males, and since males tend to have a lower prevalence of overweight/obesity compared to females, the prevalence of overweight/obesity could have been higher if more females were respondents. Results of this study cannot be generalized to all lecturers, neither can it be generalized to other middle class persons such as healthcare workers in the country. Nevertheless, this study's finding was an indication that overweight/obesity is a problem of public health concern among middle class persons such as healthcare workers in Kenya.

Healthcare workers, a subgroup falling within middle to high income bracket are particularly considered a group with greater awareness of aetiology and the risks associated with overweight/obesity (Pengpid & Peltzer, 2015). More often, they participate in overweight/obesity prevention and control interventions through counseling their clients on the same, however they have been found to be more overweight than the general population. A study conducted in USA, reported that Body Mass Index in all cadres of healthcare workers increased between the years 1982 and 2004 (Chou & Johnson, 2008). In Mexico, 52% and 23% of female and male healthcare workers were reported to be overweight (Gonzalez-Velazquez & Mendez, 2007). There are few published studies in Sub-Saharan Africa investigating overweight among healthcare workers. In South Africa, one study of healthcare workers reported an overweight/obesity prevalence rate of 73% (Supa & Linda, 2011). Similar result was also reported in Nigeria where overweight/obesity prevalence rate among healthcare workers was found to be 72% (Iwuala *et al*., 2015). All the prevalence rates reported among the healthcare workers were more than national averages estimated by WHO (W.H.O, 2014a). Notably, all the studies among healthcare workers in Mexico, South Africa and Nigeria were

conducted among healthcare workers in one tertiary hospital located in one of the biggest urban areas in respective countries. Therefore, these findings cannot be generalized to all health workers in the mentioned countries. Neither can the findings be generalized to healthcare workers in Kenya due different cultural and socio-economic settings in the countries. Evidence on prevalence of overweight among healthcare workers in Kenya is limited.

2.4 Socio-demographic Factors Associated with Overweight and Obesity

Overweight/obesity develops as a result of energy imbalance whereby energy intake exceeds energy expenditure. It is on this premise that the effect of dietary patterns and physical activity has been investigated extensively in previous researches both in developed countries (Bautista-Castano, Molina-Cabrillana, Montoya-Alonso, & Serra-Majem, 2004; Huang *et al*., 2003; Veugelers, Sithole, Zhang, & Muhajarine, 2008) and developing countries (Mbochi *et al*., 2012; Okeyo *et al*., 2009; Shayo & Mugusi, 2011). In addition, there is growing research interest on how environmental, social, cultural and genetic factors interact to influence Body Mass Index status. Furthermore, demographic characteristics play an important role in overweight and obesity aetiology.

Increasing age has consistently been associated with higher prevalence of overweight. Studies from developing countries such as Thailand (Pengpid & Peltzer, 2015), Uganda (Mayega *et al*., 2012); developed countries like England (Zaninotto, Head, Stamatakis, Wardle, & Mindell, 2009) and Canada (Torrance, Hooper, & Reeder, 2002) have consistently reported that older persons tend to have higher prevalence of overweight compared to younger persons. Even though age has been reported to be a consistent demographic predictor in most studies, it is not known whether it is associated with overweight/obesity among Kenyan healthcare workers. Hence this study sought to

find out whether age is also associated with overweight/obesity among healthcare workers in Kisumu East Subcounty.

Gender has also been associated with overweight/obesity in some studie. Globally, women have higher risk of overweight than men (W.H.O, 2015). Various population surveys in developed and developing countries have reported an association between gender and overweight. In a study conducted in USA to compare overweight and obesity trends in adults, 35.5% of women were reported to be having a higher overweight prevalence rate compared to the rate of 32.2% in males (Flegal, Carroll, Ogden, & Curtin, 2010). A meta-analysis of studies conducted in West African countries reported a significant association between gender and overweight in which women were significantly more overweight. Similar findings have also been reported in some studies conducted in Kenya (Ettarh *et al*., 2013; Jayne *et al*., 2011), though not among healthcare workers. This study therefore investigated association between gender and overweight/obesity among healthcare workers.

Socio-economic status has been reported to be associated with overweight and obesity. In developed countries, overweight/obesity has mainly been associated with low socio-economic status. An analysis of studies published in USA between the years 1990 and 2006 established that low socio-economic status groups were disproportionately affected by overweight/obesity (Wang & Beydoun, 2007). Another analysis of 333 published studies between 1988-2004 also noted an increasing proportion of positive association and a decreasing proportion of negative association as one moved from countries with high levels of socio-economic development to countries with middle to lower levels of development (McLaren, 2007). The converse is true in developing countries where high

socio-economic status has been associated with overweight/obesity. Studies conducted in African countries namely Uganda (Mayega *et al*., 2012), Tanzania (Shayo & Mugusi, 2011) and Kenya (KNBS, 2010a) have all reported positive association between high socio-economic status and overweight. Notably, all these studies in developing countries focused on the general population, thus their findings cannot be generalized to subgroups such as healthcare workers. To address this knowledge gap, this study sought to find out specifically whether socio-economic status was associated with overweight and obesity among healthcare workers.

Area of residence has also been associated with overweight/obesity as persons living in urban areas are more likely to be overweight or obese compared to residents of rural areas. Demographic and Health Surveys conducted in Kenya have found a relatively higher risk of overweight among urban residents compared to those in rural areas (Central Bureau of Statistics, 2004; KNBS, 2010a). This finding has been corroborated by a small scale cross sectional study conducted among three communities within the country which found an association between area of residence and overweight/obesity (Christensen *et al*., 2008). Similar results have also been reported in other African countries. In Mozambique and Malawi, a survey of nationally representative sample of participants in both countries reported a significantly higher prevalence of overweight among urban dwellers (Gomes *et al*., 2010; Msyamboza, Kathyola, & Dzowela, 2013). A similar study in Uganda also reported significantly higher prevalence of overweight among residents of an urban area (Kirunda, Fadnes, Wamani, Van den Broeck, & Tylleskar, 2015). These population surveys conducted in Sub-Saharan Africa consistently reported high prevalence of overweight among residents in urban areas compared to rural areas, nonetheless it is not clear from the studies whether area of residence is an independent predictor of overweight/obesity. In Kenya, it is not known

whether area of residence is associated with overweight and obesity among healthcare workers, hence the need for this study.

Marital status has been associated with overweight/obesity. A longitudinal study in USA reported that marriage was associated with a significant 2-year weight gain, and divorce with a significant 2-years weight loss (Jeffery & Rick, 2002). In a large national representative population survey in Greece involving 17341 adults, married persons had a significantly higher prevalence of overweight (Tzotzas *et al*., 2010). A survey conducted in Malaysia reported similar results (Sidik & Rampal, 2009). In the two surveys conducted in Greece and Malaysia, age was not controlled for as it is associated with higher risk of overweight. However, a large population survey with 89405 participants conducted in Iran, found an association between overweight and marital status even after controlling for age, physical activity, smoking habits and place of residence (Janghorbani *et al*., 2008). In Sub-Saharan countries, marital status has also been associated with overweight/obesity in some surveys. A South African survey reported an association, though age and other socio-demographic factors were not controlled for (Sartorius, Veerman, Manyema, Chola, & Hofman, 2015). In one study conducted in Tanzanian, marital status was associated with overweight in bivariate analysis but in multivariate analysis it was not an independent predictor (Shayo & Mugusi, 2011). Evidence on association between marital status and overweight among middle to high income groups such as healthcare workers in Sub-Saharan countries is limited, therefore this study sought to find out if marital status was associated with overweight and obesity among the healthcare workers in Kisumu East Subcounty .

Investigations on the relationship between parity and overweight have been conducted in some countries. In a longitudinal study involving 4193 women in Finland, parity was significantly associated with overweight/obesity even after adjusting for age (Luoto, Mannisto, & Raitanen, 2011). In Sub-Saharan Africa, influence of parity on overweight has not received extensive research as in developed countries. Most studies in Sub-Sahara are of cross sectional design, and some of them have reported on association of female sex with overweight without necessarily investigating the association with parity among females (Gezawa et al., 2013; Kirunda et al., 2015; Letamo, 2010). However, a population survey conducted in Nigeria found an association between increasing parity and overweight (Okoh, 2014). Similarly, a cross-sectional survey conducted in Tanzania also reported an association, but in multivariate analysis, parity was not an independent predictor of overweight (Shayo & Mugusi, 2011). Both the Nigerian and Kenyan studies were conducted in the general population, as such there is paucity of data on association between overweight/obesity and parity among population subgroups like female healthcare workers.

Having an overweight close family member has been associated with overweight/obesity. In a cross sectional study done among 1530 Turkish males, having a close overweight/obese family member was significantly associated with overweight/obesity (Sahin *et al*., 2011). This study was conducted among males, therefore its findings cannot be generalized to the general population. In USA, a survey conducted among 561 female participants linked positive family overweight/obesity history to weight gain (Lowe, Shank, Mikorski, & Butryn, 2015). The findings of this study cannot also be generalized to the general population as it was conducted on females between the ages of 21 and 30. In Sub-Saharan Africa, the link between positive familial overweight/obesity history and its effect on the risk of development of the problem among family members has not been adequately

investigated. One cross sectional study conducted in the Gambia, found that positive family overweight history was associated with overweight and obesity among respondents (van der Sande *et al*., 2001). More importantly, these studies conducted in USA, Turkey and Gambia were all observational in design and thus causality could not be demonstrated. Among the Kenyan population generally and healthcare workers in particular, little is known as to whether there is an association between being overweight/obese and having close family members with a similar problem, this study sought to address this concern.

Religious commitment is an important determinant of lifestyle and moral actions. Religion has received considerable research attention on whether it is associated with overweight and obesity. Studies on the subject have yielded mixed results. In one national sample survey in the USA, religious denomination was significantly associated with overweight/obesity among men. In this study, other aspects of religiosity such as attendance, social support and commitment were also associated with overweight, however the relationship did not hold after controlling for smoking (K. H. Kim *et al*., 2003). A longitudinal study also in the USA using data from a national sample of adults found that affiliation with Baptist religion significantly increased risk of overweight/obesity among women and not men (Cline & Ferraro, 2006). In addition, studies carried out among adherents of different religious denominations have found some religious groups such as Mormons and Seventh Day Adventists have lower rates of overweight/obesity (K. H. Kim *et al*., 2003). Most of the studies on overweight and religion have been conducted in Western countries. However, in Africa and Kenya in particular, there is limited documented information thus this study sought to adress this knowledge gap.

2.5 Lifestyle Factors Associated with Overweight and Obesity

Physical inactivity is one of the major contributing factors to the problem of overweight and obesity worldwide (W.H.O, 2015). It has consistently been associated with overweight among children (Alves, Siqueira, & Figueiroa, 2009), adolescents (Croezen, Visscher, Ter Bogt, Veling, & Haveman-Nies, 2009) and adults (Abubakari & Bhopal, 2008). Physical inactivity has not only been widely linked to overweight in developed nations (Nielsen *et al*., 2006; Sa, Heimdal, Sbrocco, Seo, & Nelson, 2016; Yancey *et al*., 2004) but also in middle and low income countries (Hajian-Tilaki & Heidari, 2007; Mayega *et al*., 2012). According to the Kenya National Diabetes Strategy 2010 – 2015, the problem of overweight and obesity in the country is to a large extent associated with physical inactivity that is characterized with overreliance on motorized transport and sitting long hours (MoPHS, 2010). Some cross sectional surveys in Kenya have corroborated this observation (Mbochi *et al*., 2012; Okeyo *et al*., 2009). These two Kenyan studies had similarities and differences, first, both studies were conducted in Nairobi which is the largest urban center in Kenya. However, one study sampled women in informal settlement whereas the other sampled mainly male university lecturers, there were also differences in sample size with one study having about three times sample size compared to the other. Despite these methodological differences, physical inactivity was still associated with overweight and obesity among the respondents. Physical activity patterns among healthcare workers in Kenya have not been documented and little known as to whether the patterns could be associated with overweight and obesity, this study sought to find out if there is an association.

Mixed results have been reported in studies investigating association between alcohol consumption and overweight/obesity in both men and women. According to a systematic review on alcohol and

BMI; more often in cross sectional studies alcohol intake is not associated with body weight in men, while either negatively or not associated with body weight in women (Sayon-Orea, Martinez-Gonzalez, & Bes-Rastrollo, 2011). Some studies in adults have found that the amount of alcohol taken per drinking session is positively associated with overweight, while the frequency of drinking is negatively associated with body weight, suggesting that frequent light drinking might be protective against gaining body weight gain (French, Norton, Fang, & Maclean, 2010; Tolstrup *et al*., 2005). In addition, other studies have found that only heavy alcohol intake is associated with overweight (Coulson *et al*., 2013; Wannamethee, Shaper, & Whincup, 2005). The variation in the results of the cross sectional surveys could be attributed to differences in target populations, sample sizes used and lack of a standard measure of alcohol intake among the study participants. Cohort studies have also not reported a conclusive consistent finding on the relationship between alcohol and overweight. A prospective cohort study of 19220 adult American women reported an inverse association between alcohol consumption and overweight. Compared with nondrinkers, initially normal-weight women who consumed a light to moderate amount of alcohol gained less weight and had a lower risk of becoming overweight/obesity (L. Wang, Lee, Manson, Buring, & Sesso, 2010). A follow up study in the USA also reported that consumption of alcohol more than the recommended limit for moderate drinking (3 drinks/day in females and 4 drinks/day in males) was associated with increased and decreased risk of overweight/obesity in females and males respectively (Chakraborty, 2014). In the cohort studies, important socio-demographic characteristics such as age, smoking and physical activity level were controlled for thus enhancing their internal validity. Most studies on the relationship between alcohol and overweight/obesity have mainly been conducted in the developing countries, little has been done in Sub-Saharan countries including Kenya on the matter, hence need for this study.

The role of smoking in overweight and obesity aetiology has been investigated in several studies. In a National Health Examination Survey conducted among adults in Germany, smoking was associated with overweight/obesity after adjusting for other demographic and behavioral variables. Elevated risk of overweight was also reported in former smokers (John, Hanke, Rumpf, & Thyrian, 2005). In contrast with this finding, a Scottish nationally representative survey found that current smokers were significantly less likely to be overweight whereas former smokers were more likely to be overweight (Mackay, Gray, & Pell, 2013). The two studies conducted in high income countries were adequately powered to investigate the relationship between overweight and smoking. Nevertheless, they were cross sectional in design hence could not account for temporal relationship between smoking and overweight. In one follow up study involving 25312 Japanese workers, a significantly increased risk of overweight/obesity was reported among male and female workers who smoked at least 20 cigarettes per day (Watari *et al*., 2006). In Sub-Saharan Africa, the relationship between smoking and overweight/obesity has not been extensively studied as in high income countries, especially in longitudinal design studies. For instance, one cross sectional study conducted in Tanzania with a sample size of 9254 reported an inverse relationship between body weight and smoking. In Kenya, prevalence of smoking has been investigated in some studies but its association with overweight has not been demonstrated (Lo *et al*., 2013; Nturibi, Akinsola, & McCurdy, 2009). Therefore, this study sought to find out whether smoking was associated with overweight and obesity among healthcare workers in Kisumu East Subcounty.

The role of shift work in aetiology of overweight/obesity has been investigated in some countries. So far, there are mixed results on the subject. A study conducted among 2086 female Australian nurses found an association between shift work and overweight/obesity (Zhao *et al*., 2012), same result was

also reported in a study of 724 Polish nurses (Peplonska, Bukowska, & Sobala, 2015). An analysis of data from the fourth and the fifth Korea National Health and Nutrition Examination Survey 2008-2011 (Son, Ye, Kim, Kang, & Jung, 2015) found a significantly increased risk of overweight/obesity among shift workers. These studies were dissimilar, whereas overweight in the Korean study was measured by body fat percentage, overweight/obesity in both the Australian and Polish studies was determined by calculation of Body Mass Index. A cross sectional study among male workers at two plants in Sweden reported no association between shift work and overweight (Karlsson, Knutsson, Lindahl, & Alfredsson, 2003). A prospective longitudinal study with 469 participants that incorporated two 5-year periods in England, reported that weight gains exceeding 5 and 7 kg were more frequent in nurses on night work compared to daytime work (Niedhammer, Lert, & Marne, 1996). These studies were all conducted in developed countries, and some of them targeted healthcare workers, rightly so because majority of them work in shifts as healthcare services must run 24 hours a day daily. The findings of these studies may not be generalized to African countries and Kenya in particular where little is known on the link between overweight and shift work among healthcare workers. Therefore this study sought to address this paucity of evidence among healthcare workers.

Inadequate sleep (<7hours per day) has received considerable research interest on its possible association with overweight/obesity. Some cross sectional studies have reported a positive association between short sleep duration and overweight/obesity in adults of either gender (Shigeta, Shigeta, Nakazawa, Nakamura, & Yoshikawa, 2001; Vioque, Torres, & Quiles, 2000). Others have reported an association in one gender, such as the one conducted in the UK involving 6797 respondents whereby short sleep duration was associated with overweight in men but not in women

(Heslop, Smith, Metcalfe, Macleod, & Hart, 2002). A similar study in France with a sample size of 3127 reported an association in women but not in men (Cournot *et al*., 2004). Other cross sectional studies have reported no association between inadequate sleep and overweight/obesity (Lauderdale *et al*., 2006; Ohayon, 2004) while others have reported an inverse association (Ko *et al*., 2007; Kohatsu *et al*., 2006). These cross sectional studies had notable limitations, some of them did not control for important confounding socio-demographic and lifestyle factors such as socio-economic status, physical activity and alcohol consumption. Furthermore, all of them were conducted in developed countries, none in sub-Saharan Africa. The association between overweight/obesity and inadequate sleep has also been investigated in prospective cohort studies. In the 16 year follow up study of 68183 women nurses in the USA, a positive association was reported (Patel, Malhotra, White, Gottlieb, & Hu, 2006). Similar results were reported in the US National Health And Nutrition Examination Study (NHANES) which had 9588 participants (Gangwisch, Malaspina, Boden-Albala, & Heymsfield, 2005) and Zurich (Switzerland) cohort study with 496 participants (Hasler *et al*., 2004). Unlike cross sectional studies, the cohort studies can demonstrate temporal relationship between overweight and inadequate sleep. However, the results may not be generalized to African countries due to differences in culture and socioeconomic settings. In the African countries, little is known on the association between overweight/obesity and inadequate sleep. Consequently, this study focused on investigating this association among healthcare workers.

2.5 Psycho-social Factors Associated with Overweight and Obesity

Perceived BMI status regardless of measured weight has been associated with overweight/obesity in some studies. This is so, mainly because persons who perceive themselves to be overweight regardless of objectively measured body mass index are more likely to engage in weight loss

behaviour hence they are less likely to be overweight (Strauss, 1999). A study among Mexican adolescents aged 17 – 19 years found that those who perceived themselves to be overweight regardless of measured weight status, from either gender, engaged more in weight loss behaviour and had reduced risk of overweight than those who perceived themselves to be of normal weight (Hidalgo-Rasmussen, Ramirez-Lopez, Montano Espinoza, & Hidalgo-San Martin, 2013). In contrast, a 6 year follow up study in the USA among 2445 participants found that perceived overweight status at baseline was associated with overweight later in life (Duong & Roberts, 2013). Notably, both studies were conducted among teenagers thus their findings may not be generalized to adults. In developing countries, the relationship between perceived weight status and overweight/obesity has not received adequate research attention. To a large extent, studies in the third world countries have been cross sectional, and have mainly investigated agreement between perceived body weight status and measured weight in order to determine body weight underestimation or overestimation. For example, a study conducted among healthcare workers in South Africa found more than three quarters of overweight respondents underestimated their body weight (Supa & Linda, 2011). However, it is not clear from the study whether underestimation of body weight was associated with overweight. Furthermore, respondents in this study were from one tertiary hospital situated in an urban area, therefore all healthcare workers in the country cannot be presumed to be more likely to underestimate their weight. Outside South Africa, similar results were reported in a survey conducted among residents of informal settlements in Nairobi and another conducted among rural residents in Nigeria where respondents were more likely to have an incorrect perception of their weight and the most dominant form of incorrect perception was body weight underestimation (Akinpelu, Oyewole, & Adekanla, 2015; Ettarh *et al*., 2013). Notably, the

relationship between perceived body weight and overweight/obesity was not determined in these studies, as such this study sought to address this gap in knowledge among healthcare workers.

Closely related to perception is satisfaction with own body weight. Studies on the relationship between satisfaction and overweight have mainly dealt with the weight loss behavior resulting from satisfaction with own body weight. Most studies have found that persons dissatisfied with own body weight are more likely to attempt weight loss so as to achieve desirable body weight (Anderson et al., 2002b; Anderson, Janes, Ziemer, & Phillips, 1997). Typically, women tend to view themselves heavier than they actually are and are more likely to be dissatisfied with their own body weight than men in the same body mass index category (Anderson et al., 2002b). On the hand, men more often express satisfaction with own body weight even if they are overweight (Green *et al*., 1997). In a national survey conducted in the USA among 19347 respondents, overweight was associated with satisfaction with own body weight (Kuk *et al*., 2009). Similarly, In a large scale cross sectional survey conducted in Canada, authors reported that persons dissatisfied with their weight status were more likely to attempt weight loss but did not report whether own weight satisfaction or dissatisfaction was associated with overweight (Green *et al*., 1997). Most investigations on the influence of satisfaction with own body weight have been conducted in developed countries, despite the studies being robustly designed and conducted, their finding cannot be generalized to African countries and Kenyan healthcare workers in particular. Hence, this study aimed to fill this knowledge gap by determining if satisfaction with own body weight status was associated with overweight and obesity among healthcare workers.

There is growing research interest on the link between stress and overweight/obesity. Some biological studies have proposed physiological mechanism through which stress leads to weight gain (Dallman, 2010; Foss & Dyrstad, 2011; Holmes *et al*., 2010). Though, observational surveys have found mixed results. A 13 year follow up study conducted in the USA found an association between high baseline stress and overweight/obesity among black women but not men (Fowler-Brown *et al*., 2009). Another follow up study in the USA involving 1355 adults, reported a significant weight gain among those who had stress. Important factors namely age, physical activity, sex and socioeconomic status were controlled for in this study (Block, He, Zaslavsky, Ding, & Ayanian, 2009). A cross sectional survey of 45810 Finnish employees found an association between stress and overweight/obesity but after adjusting for socioeconomic status, the relationship attenuated (Kouvonen, Kivimaki, Cox, Cox, & Vahtera, 2005). In a national survey in Canada involving 112117 participants, stress was associated with overweight/obesity in women and not men. Potential confounders such as age, sex, education level, marital status and physical activity were controlled for (Chen & Qian, 2012). Even though BMI was uniformly measured across all these studies, level of stress was not measured using a similar tool across all the studies, hence the findings are not readily generalizable. In Kenya, not much is known on the association between overweight/obesity and stress among healthcare workers, consequently this study sought to investigate this association.

2.6 Conceptual Framework

The conceptual framework for this study is adopted and modified from Bridging the Gap (BTG) Program research work (Chaloupka & Powell, 2009). According to the BTGs framework, overweight aetiology involves interaction of environmental, individual and social factors. In this study overweight/obesity, which was the dependent variable was conceptualized to be associated with independent variables namely demographic, lifestyle and psycho-social as illustrated below.

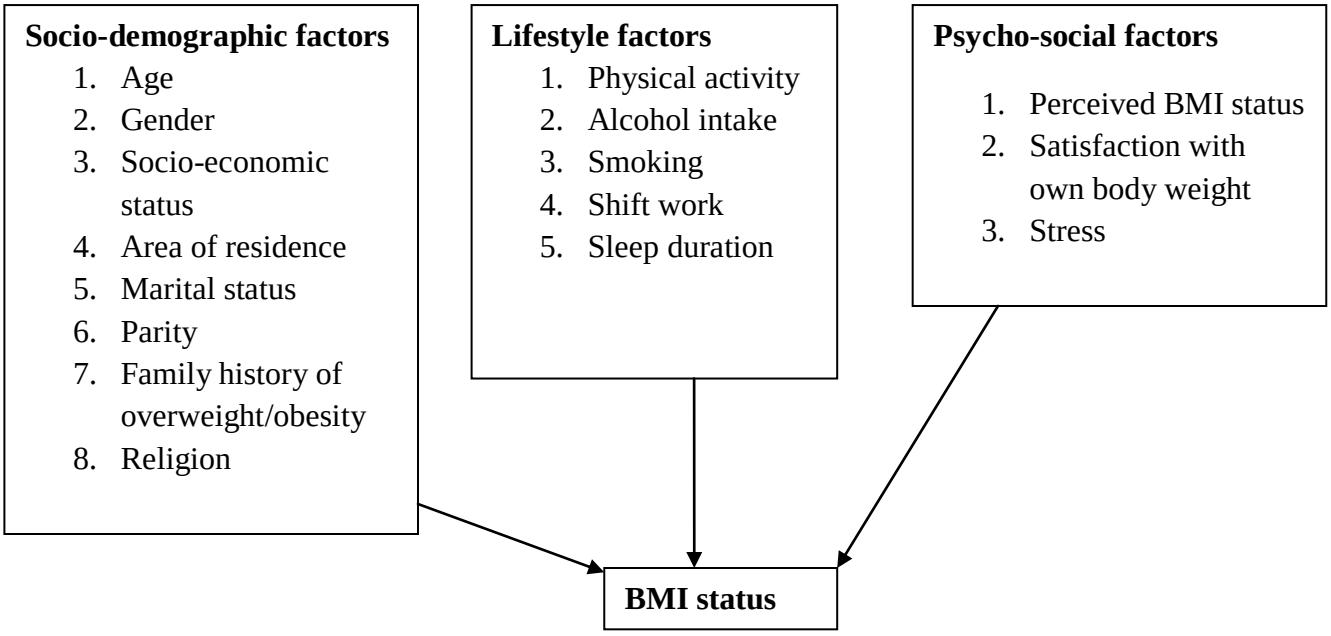

Figure 2.1: Conceptual framework showing the association between socio-demographic, lifestyle and psycho-social factors and BMI status. The framework is adopted and modified from Bridging the Gap (BTG) Program research work (Chaloupka & Powell, 2009).

CHAPTER THREE

3.0 RESEARCH METHODS

3.1 Introduction

This chapter presents description of the study area, study design, study population, inclusion criteria, exclusion criteria, sample size determination and sampling procedures, data collection instruments and procedures, pretesting and training of research assistant, data analysis and finally ethical considerations.

3.2 Study area

Kisumu East subcounty is found in Kisumu County, which is located in the former Nyanza Province of Kenya. It lies within longitude 34^0 10' E and 35^0 20' E and latitude 0^0 20' S and 0^0 50' S (GoK, 2009). It has a population of 473 479 according to 2009 census with an estimated population density of 1000 persons per km^2 (KNBS, 2010b). The subcounty covers a total area of 557.7 Km^2. It borders Nyando subcounty to the East, Nandi subcounty to the North East, Emuhaya to the North, Kisumu West to the West and Rachuonyo subcounty to the South across the lake. Public health facilities in the subcounty comprise of 1 tertiary referral hospital, 1 subcounty referral hospital, 7 health centers and 26 dispensaries. The 2 referral hospitals are in an urban area, 1 health center is located within a peri-urban area while the rest of the health facilities are based in rural parts of the sub-county. There were a total of 783 healthcare workers of different cadres working in the public health facilities (GoK, 2009).

Kisumu East subcounty was also chosen for the study because the public health system in the sub-county comprises all the 4 tiers of health service delivery in Kenya (MoH, 2012). As such, different

cadres of healthcare workers were represented in the subcounty and this would enhance external validity of this study.

3.3 Study Design

The design of this study was analytic cross sectional, both independent and dependent variables were collected simultaneously at one particular point in time and associations determined.

3.4 Target Population

Target population was healthcare workers in public health facilities in Kisumu East subcounty where majority of them work.

3.4.1 Inclusion Criteria

Inclusion criteria was consenting participants from either gender who had attended a recognized post-secondary medical training institution and obtained a degree, higher national diploma, diploma or certificate qualification in any health related area such as medicine and surgery, nursing, pharmacy, dentistry, environmental health, clinical medicine, laboratory technology, nutrition, radiography, occupational therapy, physiotherapy and medical social work.

3.4.2 Exclusion Criteria

Those who declined to give informed consent, those who were absent or hospitalized due to illness during the data collection period and pregnant female healthcare workers.

3.5 Sample Size Determination

The following formula was used to determine sample size;

$n=z^2pq/d^2$ (Fisher, Laing, Stoeckel, & Townsend, 1991)

Where

n = desired sample size if target population is > 10,000

z = standard normal deviate at the required confidence level

d = the marginal error allowed or degree of accuracy desired (in this case 95% confidence limit, thus marginal error allowed, d=0.05).

p = the proportion of the target population estimated to have the characteristic being measured (14%) (Jayne *et al*., 2011)

q = 1- p

$= (1.96)^2 (0.14) (0.86)/0.05^2$

= 185

Since target population was below 10,000 an adjustment was made using the formula: nf = n/ (1+ n/N) (Fisher *et al*., 1991), where;

nf = the desired sample size when the population is less than 10,000

n = the desired sample size when the population is more than 10,000

N = the estimate of the actual target population (783 according to records in Kisumu East DMOH's office as at January 2013)

nf = n/[1+(n/N)]

185/ (1+ (185/783) = 150

Allowing for 10% non-response

n = 165

3.6. Sampling Procedure

Population of healthcare workers by cadre in each health facility was obtained from the Kisumu East subcounty Medical Officer of Health (health centers and dispensaries); the Medical Superintendent

of Kisumu East County Referral Hospital and the Administrator, Jaramogi Oginga Odinga Teaching and Referral Hospital (Appendix VI). Sample size proportionate to population size in each health facility as well as sample size proportionate to each cadre population size was determined as shown in Table 3.1.

At respective health facilities, systematic random sampling was used to select participants. A healthcare worker in the consultation room/office/ward nearest to the entrance was picked, thereafter every k^{th} healthcare worker within the room or the next rooms was selected, whereby k = N/n, 'N' being cadre population size present during data collection period and 'n' being sample size required within the cadre (Appendix IX). Number of healthcare workers present during data collection date was obtained from respective health facility In-charges.

Table 3.1 Sample size per cadre from each participating health facility

Health Facility	Professional Cadre															
	Doctors	Medical social workers	Counselors	Health records officers	Oral health officers	Medical engineers	Health administrative officers	Clinical officers	Nurses	Lab. technologists	Nutrition officers	Public health officers	Radiographers	Occupational therapists	Physiotherapists	Totals
Jaramogi Oginga Odinga Teaching & Referral Hospital	8	4	3	2	0	1	1	9	52	9	4	5	2	3	2	**105**
Kisumu East District Hospital	2	3	1	1	4	0	0	4	16	2	1	0	2	0	3	**39**
Rabuor Health Center	1	0	1	0	0	0	0	1	1	0	0	1	0	0	0	**5**
Nyang ande Health Center	0	0	0	0	1	0	0	0	2	2	0	0	0	0	0	**5**
Hongo-Ogosa Health Center	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
Nyalunya Health Center	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	**2**
Kodiaga Prison Health Center	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	**3**
Ober Kamoth Health Center	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	**2**
Migosi Health Center	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	**3**
Totals	**11**	**7**	**5**	**3**	**5**	**1**	**1**	**16**	**76**	**15**	**5**	**8**	**3**	**3**	**5**	**165**

3.7 Data Collection Procedures

Data was collected by use of self-administered questionnaires, height measuring bar and electronic weighing scale. Data collected by the questionnaire was age, sex, marital status, residence, religion, cadre, household income, duration of employment and parity for females. For lifestyle variables, participants were asked to state their smoking status, frequency and number of cigarettes smoked. To measure alcohol intake, participants were asked their alcoholic intake status, frequency and number of standard alcoholic beverages taken. Alcohol intake and smoking measurements were adopted and modified from the WHO STEPS instrument for chronic disease risk factor surveillance (WHO, 2002b). Sleep adequacy was determined by asking participants to indicate how many hours they sleep on a typical 24-hour day. Regarding self-body size perception, participants were asked whether they perceive their body weight to be underweight, normal, overweight or obese. To measure satisfaction with body weight, they were asked whether they are satisfied with their own body weight. Stress was measured by asking the following question "thinking about the amount of stress in your life, would you say that most days are; not at all stressful, not very stressful, a bit stressful, quite a bit stressful, extremely stressful.

Physical activity in Section B was measured by asking respondents to state whether they engage in vigorous intensity or moderate intensity exercises. Duration and frequency of exercises per week was also asked. Respondents were also asked to state their typical mode of travel from place to place i.e. whether cycling or walking. Duration and frequency per week of walking or bicycling was also asked. The physical activities questions were adopted and modified from the Global Physical

Activity Questionnaire (GPAQ). This tool was developed by WHO for physical activity surveillance mainly in developing countries (WHO, 2002a).

In section C, anthropometric measurements were taken using electronic weighing scale for weight, height measuring rod was used to measure height. Height of respondents was recorded to the nearest 0.1 cm and weight to the nearest 0.1 kg.

Body Mass Index (BMI) was calculated as follows

BMI = weight (kg)/ height $(m)^2$.

BMI was then classified according to WHO (1997) guidelines as follows.

BMI Classification

Underweight

<18.5 kg/m^2

Normal weight range

18.5-24.9 kg/m^2 - Normal weight.

Overweight range

25.0-29.9 kg/m^2 - Overweight

30.0– 34.9 kg/m^2 – Obese class I.

35.0 – 39.9 kg/m^2– Obese class II

≥ 40 kg/m^2– Obese class III

3.8 Study Tools Pretest and Training of Research Assistants

Study instruments were pretested in Ahero sub-county Hospital among 17 Healthcare workers. The number of healthcare workers that participated in the pre-test were 10% of actual sample size as recommended in pretests (Baker, 1994). Ahero sub-county Referral Hospital was chosen for the pre-test because it was a nonparticipating Level 4 hospital with both outpatient and inpatient facilities. The health facility was also located in the neighboring Nyando sub-county within Kisumu county and had a mix of different cadres of healthcare workers. The pre-test was carried purposely to familiarize research assistants with study collection tools, train research assistants on data collection procedures including ethical considerations, familiarize with operation of data collection instruments, remove any ambiguities and improve clarity of questions in the questionnaire and to estimate time taken per participant in filling the questionnaire. The pretest also helped in determination of the appropriate time and place to administer the questionnaire and take anthropometric measurements from healthcare workers. Feedback from the healthcare workers were taken into consideration in revision of the data collection tool.

Research assistants recruited to assist in data collection were both BSc. Nutrition students in Kenyatta University who were on attachment at Jaramogi Oginga Odinga Teaching and Referral Hospital .

3.9 Data Analysis

All questionnaires were checked for completeness at the end of each day of data collection. Data was entered and analyzed using SPSS version 16.0. Categorical variables were analyzed using frequencies, continuous variables were converted and analyzed as categorical variables. To determine factors associated with overweight/obesity Chi-square test was used, in instances where

assumptions of Chi-square test were violated, Fisher's exact test was used. Logistic regression analysis was used to determine independent predictors of overweight and obesity. Reported *p*-values were based on two-sided tests at a significance level of 0.05.

3.10 Ethical Considerations

This study was approved by the School of Graduate Studies, Maseno University. Ethical clearance was sought from the Ethical Review Committees of Maseno University and Jaramogi Oginga Odinga Teaching and Referral Hospital. Permission to carry out the study in the site was sought from The Director of Health – Kisumu County, Kisumu East Sub-county Medical Officer of Health, Medical Superintendent of Kisumu East Sub-County Hospital, and all officers in charge of health facilities participating in the study.

Written informed consent was sought from each research participant after explaining the purpose, procedure and benefits of the study. They were informed that participation in the study was voluntary and they had a right to refuse to participate in the study or to withdraw consent at any time during administration of the questionnaire without reprisal. Participants were also informed that some of the questions may be deemed to be personal but confidentiality of the same was to be strictly observed. All questionnaires had no identification information for any individual and anthropometric measurements were taken in a private place. The contact of Maseno University Ethical Review Committee was also given in case any participant wanted further clarification on ethical issues of the study. At the end of each data collection day, questionnaires and consent forms were collected and locked up in a secure place.

CHAPTER FOUR

4.0 RESULTS

4.1 Introduction

In this chapter, findings of the study are presented according to study objectives. First, demographic characteristics, distribution of BMI across different demographic characteristics and overweight/obesity distribution basing on body fat percentage is presented. This is followed by Socio-demographic, lifestyle and finally psycho-social factors associated with overweight/obesity.

4.2 Socio-demographic Characteristics of Respondents

A total of 165 respondents participated in this study. Mean age is 37.1 (SD 8.7) years and median income is Ksh 47000 (IQR Kshs 30000-56000). Majority of respondents are female 65.5% (108) while males constitute 34.5% (57). A greater proportion of respondents, 46.7% (77) are between the age of 30-39, 24% (40) are between the age of 40-49 years while 18.8% (31) are below 30 years. Socio-demographic characteristics of the respondents are presented in Table 4.1.

Table 4.1 Socio-demographic Characteristics of Respondents

Characteristic	n (%)
Gender	
Male	57 (34.5)
Female	108(65.5)
Age	
20-29	31 (18.8)
30-39	77 (46.7)
40-49	40 (24.2)
50-59	17 (10.3)
Marital status	
Single	34 (20.6)
Married	125(75.8)
Separated	2 (1.2
Widowed	4 (2.4)
Religion	
Protestant	86 (52.1)
Catholic	47 (24.5)
SDA	30 (18.9)
No religion	2 (1.2)
Monthly income	
0-29999	23 (13.9)
30000-59999	105(63.6)
60000-89999	27(16.4
>90000	10(6.1)
Residence	
Urban	120(72.3)
Rural	45 (27.3)
Parity	
0-1	30(18.2)
2-3	52(31.5)
≥4	26(15.8)
Family obesity history	
Yes	33(20.0)
No	132(80)

4.3 Distribution of BMI Across Different demographic Characteristics

Out of all respondents, 41.2% (68) have normal weight; 30.9% (51) are overweight; 20% (33), 6.7% (11) and 1.2% (2) have class I class II and class III obesity respectively. Distribution of BMI across different socio-demographic characteristics is shown in Table 4.2.

Table 4.2Distribution of BMI Across Different Socio-demographic Characteristics

Characteristics	BMI Distribution					
	18.5-24.9 n (%*) Normal	25-29.9 (n%*) Overweight	30-34.9 (n%*) Obese class I	35-39.9 (n%*) Obese class II	>40(n%*) Obese class III	Total (%)
Gender						
Male	31 (54.4)	17 (29.8)	9 (15.8)	0	0	57 (34.5)
Female	37 (34.3)	34 (31.5)	24 (22.2)	11 (10.2)	2 (1.8)	108(65.5)
Total	68 (41.2)	51 (30.9)	33 (20)	11 (6.7)	2 (1.2)	165(100)
Age						
20-29	23 (74.2)	7 (22.6)	1 (3.2)	0	0	31 (18.8)
30-39	35 (45.5)	25(32.5)	13 (16.9)	3 (3.9	1 (1.3)	77 (46.7)
40-49	8 (20)	12 (30)	15 (37.5)	5 (12.5)	0	40 (24.2)
50-59	2 (11.8)	7 (41.2)	4 (23.5)	3 (17.6)	1 (5.9)	17 (10.3)
Total	68 (41.2)	51 (30.9)	33 (20)	11 (6.7)	2 (1.2)	165(100)
Marital status						
Single	23 (67.6)	9 (26.5)	1 (2.9)	1 (2.9)	0	34 (20.6)
Married	43 (34.4)	41 (32.8)	29 (23.2)	10 (8.0)	2 (1.6)	125(75.8)
Separated	1 (50)	1 (50)	0	0	0	2 (1.2
Widowed	1 (25)	0	3 (75)	0	0	4 (2.4)
Total	68 (41.2)	51 (30.9)	33 (20)	11 (6.7)	2 (1.2)	165(100)
Religion						
Protestant	35 (40.69)	27 (31.4)	17 (19.8)	6 (7.0)	1 (1.2)	86 (52.1)
Catholic	25 (53.2)	10 (21.3)	9 (19.1)	3 (6.4)	0	47 (24.5)
SDA	8 (26.7)	12 (40.0)	7 (23.3)	2 (6.7)	1 (3.3)	30 (18.9)
Others	0	2 (100)	0	0	0	2 (1.2)
Total	68 (41.2)	51 (30.9)	33 (20.0)	11 (6.7)	2 (1.2)	165(100)
Monthly income						
0-29999	12 (52.2)	8 (34.8)	1 (4.3)	2 (8.7)	0	23 (13.9)
30000-59999	43 (41.0)	31 (29.5)	25 (23.8)	5 (4.8)	1 (1.0)	105(63.6)
60000-89999	11 (40.7)	7 (25.9)	5 (18.5)	3 (11.1)	1 (3.7)	27(16.4
≥90000	2 (20.0)	5 (50)	2 (20)	1 (10)	0	10(6.1)
Total	68 (41.2)	51 (30.9)	33 (20.0)	11 (6.7)	2 (1.2)	165(100)
Residence						
Urban	49 (40.8)	38 (31.7)	21 (17.5)	10 (8.3)	2 (1.7)	120(72.3)
Rural	19 (42.2)	13 (28.9)	12 (26.3)	1 (2.2)	0	45 (27.3)
Total	68 (41.2)	51 (30.9)	33 (20.0)	11 (6.7)	2 (1.2)	165(100)
Parity						
0-1	15(50.0)	10(33.3)	3(10.0)	2(6.7)	0	30(18.2)
2-3	17(33.3)	16(31.5)	17(31.5)	2(3.7)	0	52(31.5)
≥4	5(19.2)	7(26.9)	5(19.2)	7(26.9)	2(7.7)	26(15.8)
Total	38(34.5)	34(30.9)	25(22.7)	11(10)	2(1.8)	108(65.5)
Family obesity history						
Yes	9(27.3)	7(21.2)	10(30.3)	5(15.2)	2(6.1)	33(20.0)
No	59(44.7)	44(33.3)	23(17.4)	6(4.5)	0	132(80.0)
Total	68(41.2)	51(30.9)	33(20.0)	11(6.7)	2(1.2)	165(100)

*Percentage in a BMI category of a given socio-demographic characteristic

4.5 Socio-demographic Factors Associated with Overweight and Obesity

Gender is significantly associated with overweight, a higher proportion of females, 65.7% (71) have a significantly higher risk of overweight and obesity compared to males 45.6% (26) $p = 0.013$. Age as well is significantly associated with overweight and obesity, majority of respondents in higher age brackets are overweight or obese. For example, 88.2% (15) of respondents between 50-59 years are either overweight or obese compared 25.8% (8) of respondents in the age bracket of 20-29 years $p < 0.001$. Marital status is also associated with overweight and obesity, a significantly greater proportion of married respondents 65.6% (82) are overweight or obese compared to those who are single 32.4% (11) $p = 0.002$. Other socio-demographic factors namely religion, monthly income, area of residence, parity and family obesity history are not associated with overweight and obesity $p \geq 0.05$ (Table 4.3).

Table 4.3Bivariate Analysis on Demographic Factors Associated with Overweight and Obesity among Healthcare Workers in Kisumu East Subcounty

Characteristic	BMI Status		χ^2 statistic	Fisher's exact statistic	*df*	*p*-value
	Normal weight n(%)	Overweight /obese n(%)				
Gender						
Male	31(54.4)	26(45.6)	6.24		1	0.013*
Female	37(34.3)	71(65.7)				
Age						
20-29	23(74.2)	8(25.8)	28		3	<0.001*
30-39	35(45.5)	42(54.5)				
40-49	8(20.0)	32(80.0)				
50-59	2(11.8)	15(88.2)				
Marital status						
Single	23(67.6)	11(32.4)		12.7		0.002*
Married	43(34.4)	82(65.6)				
Separated	1(50.0)	1(50.0)				
Widowed	1(25.0)	3(75.0)				
Religion						
Protestant	35(40.7)	51(59.3)		6.4		0.07
Catholic	25(53.2)	22(46.8)				
SDA	8(26.7)	22(73.3)				
No religion	0	2(100)				
Monthly income						
0-29999	12(52.2)	11(47.8)		2.9		0.403
30000-59999	43(41.0)	62(59.0)				
60000-89999	11(40.7)	16(59.3)				
≥ 90000	2(20.0)	8(80.0)				
Area of residence						
Urban	49(40.8)	71(59.2)		0.026		1.0
Rural	19(42.2)	26(57.8)				
Parity						
0 -1	15(50.0)	15(15.0)	5.9		2	0.054
2 to 3	17(33.3)	35(66.7)				
≥ 4	5(19.2)	21(80.8)				
Family obesity history						
Yes	9(27.3)	24(72.7)	3.3		1	0.078
No	59(44.7)	73(55.3)				

*$p < 0.05$.

4.6 Lifestyle Factors Associated with Overweight and Obesity

Participating in vigorous physical activity is associated with overweight and obesity in bivariate analysis, a greater percentage of persons who do not engage in vigorous physical activity 64.2% (79) are either overweight or obese compared to those who engage in vigorous physical activity, 42.9% (18) $p = 0.013$. Smoking is excluded from bivariate analysis as only one respondent reported is a smoker. Other lifestyle factors namely alcohol consumption, hours of sleep per day, night shift work, moderate physical activity, history of walking to places and hours spent sitting per day are not significantly associated with overweight and obesity $p \geq 0.05$ (Table 4.4).

Table 4.4 Lifestyle Factors Associated with Overweight and Obesity among Healthcare Workers in Kisumu East subcounty

Characteristic	BMI Status		χ^2 statistic	Fisher's exact statistic	*df*	*p*-value
	Normal weight n(%)	Overweight/obese n(%)				
Alcohol consumption in past year						
Yes	21 (44.7)	26 (55.3)	0.33		1	0.602
No	47 (39.8)	71 (60.2)				
No. standard alcoholic drinks in past month						
1-4	10 (41.7)	14 (58.3)		1.479		0.569
5-8	7 (50)	7 (50)				
>9	0	2 (100)				
Frequency of alcohol consumption in past month						
1-5 days	11 (37.9)	18 (62.1)		0.706		0.694
6-10 days	3 (50)	3 (50)				
>10	3 (50)	3 (50)				
Hours of sleep						
3 to 4	2 (33.3)	4 (66.7)	4.83		3	0.182
5 to 6	20 (31.7)	43 (68.3)				
7 to 8	44 (48.9)	46 (51.1)				
≥ 9	2 (33.3)	4 (66.7)				
Night shift work						
Yes	28 (36.8)	48 (63.2)	1.11		1	0.292
No	40 (44.9)	49 (55.1)				
Vigorous physical activity						
Yes	24 (57.1)	18 (42.9)	5.9		1	0.013*
No	44 (35.8)	79 (64.2)				
Moderate physical activity						
Yes	44 (42.3)	60 (57.7)	0.14		1	0.709
No	24 (39.3)	37 (60.7)				
History of walking to places						
Yes	58 (44.3)	73 (55.7)	2.46		1	0.117
No	10 (29.4)	24 (70.6)				
Hour spent sitting per day					3	
≤ 4	29 (41.4)	41 (58.6)		0.22		0.988
5 to 6	23 (41.8)	32 (58.2)				
7 to 8	12 (38.7)	19 (61.3)				
≥ 9	4 (44.4)	5 (55.6)				

*$p < 0.05$.

4.7 Psycho-social Factors Associated with Overweight and Obesity

Psycho-social factors investigated are perceived BMI status, stress and satisfaction with own body weight. Table 4.5 shows the level of accuracy of perceived BMI status *vis a vis* the actual objectively

assessed BMI among the health workers. There is a high level of underestimations for cases that are overweight (66.7%) and obese (82.6%) within group assessment. This imply that majority of health care workers perceives their weight-height ratio as normal when they are truly overweight/obese. Further analysis of the discrepancies that exists between the actual measurement outcomes and the perceived outcomes reveals significant differences (χ=66.69, p<0.001) depicting a situation of denial or lack of adequate weight monitoring among the healthcare workers

Table 4.5: Accuracy of Perceived BMI among Healthcare Workers in Kisumu East sub-county

Obesity/overweight status of actual measurement	Accuracy level of BMI perception			Discrepancies	
	Measured BMI (%)				
	Underestimation	Agreement	Overestimation	χ^2 statistic	*p* value
Normal	9 (13.2)	55 (80.9)	4 (5.9)	66.69	<0.001*
Overweight	34 (66.7)	16 (31.4)	1 (2.0)		
Obese	38 (82.6)	7 (15.2)	1 (2.2)		

Further analysis (Table 4.6) reveals that satisfaction with own body weight is significantly associated with overweight and obesity p = <0.001. However, there is no significant association between stress level and overweight/obesity p = 0.6.

Table 4.6: Psycho-social Factors Associated with Overweight and Obesity among Healthcare Workers in Kisumu East sub-county

Characteristic	Measured BMI Status		χ^2 statistic	*df*	*p*-value
	Normal weight n (%)	Overweight /obese n (%)			
Stress level					
Not all stressful	6(54.5)	5(45.5)	2.8	4	0.6
Not very stressful	19(46.3)	22(53.7)			
A bit stressful	27(36.5)	47(63.5)			
Quite a bit stressful	12(37.5)	20(62.5)			
Extremely stressful	4(57.1)	3(42.9)			
Satisfaction with own body weight					
Yes	54(51.4)	51(48.6)	12.4	1	<0.001*
No	14(23.3)	46(76.7)			

*$p < 0.05$

4.8 Independent Predictors of Overweight and Obesity

In logistic regression analysis of factors that are significant in bivariate analysis, females are twice more likely to be overweight or obese compared to men OR (95% CI) = 1.8(0.86-3.99), but this is not statistically significant, p = 0.118. Increasing age is a statistically significant independent predictor for overweight and obesity, respondents in the age bracket of 40-49 are seven times more likely to be overweight or obese compared to those below 30 years OR (95% CI) = 7.3(2.0-25.98) p = 0.002 whereas respondents in the age bracket of 50 – 59 are 17 times more likely to be overweight compared to respondents below the age of 30 OR (95% CI) = 17 (2.7-104.8). With regard to marital status, married persons are one and half more likely than single persons to be overweight or obese OR (95% CI) = 1.6(0.59-4.20), however this is also not statistically significant, p = 0.363. Respondents engaging in vigorous physical activity are about one third less likely to be overweight or obese compared to those who do not engage in vigorous physical activity OR (95% CI) = 0.7(0.31-1.58), although this is also not statistically significant p = 0.384 (Table 4.5).

Table 4.7 Independent Predictors of Overweight and Obesity among Healthcare Workers in Kisumu East sub-county

Characteristic	OR(95% CI)	S.E	Wald	*df*	*p* - value
Gender					
Male	Reference				
Female	1.8(0.86-3.99)	0.39	2.44	1	0.118
Age					
20-29	Reference				
30-39	2.4(0.86-6.93)	0.53	2.79	1	0.095
40-49	7.3(2.0-25.98)	0.69	9.40	1	0.002*
50-59	17.0(2.7-104.80)	0.93	9.28	1	0.002*
Marital status					
Single	Reference				
Married	1.6(0.59-4.20)	0.5	0.83	1	0.363
Separated	1.7(0.08-35.44)	1.55	0.42	1	0.732
Widowed	0.8(0.057-10.12)	1.32	0.04	1	0.762
Vigorous physical activity					
No	Reference				
Yes	0.7(0.31-1.58)	0.42	0.76	1	0.384

*$p < 0.05$

CHAPTER FIVE

5.0 DISCUSSION

5.1 Introduction

This chapter discusses the findings of the study as per each objective. The findings are compared and contrasted with similar studies conducted elsewhere and reasons for the findings are also presented. Discussion of findings with respect to the first objective which is socio-demographic factors associated with overweight/obesity is presented first. This is followed by lifestyle and finally psycho-social factors associated with overweight/obesity.

In this study, there is no parity in terms of gender representation, a greater proportion of respondents in this study were females. This is because in all health facilities, nurses were the majority cadre and a greater proportion of nurses were female. Since selection of participants was done proportional to professional cadre population size, females were more.

5.2 Socio-demographic Factors Associated with Overweight and Obesity

Age is an independent predictor of overweight/obesity. This finding is consistent with similar previous studies conducted in developing countries such as Kenya (KNBS, 2010a), Uganda (Mayega *et al*., 2012) Thailand (Pengpid & Peltzer, 2015) and developed countries such as England (Zaninotto *et al*., 2009) and Canada (Torrance *et al*., 2002). According to the WHO (1997), increasing age is characterised by reduction in physical activity and decrease in metabolic activity. As healthcare workers advance in age, they could become more preoccupied with other concerns other than personal health, this may include but not limited to parenting, career progression and

economic empowerment. This may also lead to relegation of personal health to a secondary consideration, resulting to adoption of lifestyle that could promote development of overweight and obesity.

Female respondents have a significantly higher prevalence of overweight/obesity compared to males. This finding is corroborated by various population surveys in both developed and developing countries (Ettarh *et al*., 2013; Flegal *et al*., 2010; Jayne *et al*., 2011). Furthermore, data compiled globally indicate that females are more affected by overweight/obesity compared to males (Finucane *et al*., 2011). Several reasons could account for this observation; women tend to gain the greatest amount of weight during the age range of 25–44 years. Within this childbearing age, one potential pathway for the development of overweight is through the retention of gestational weight gain (Siega-Riz, Evenson, & Dole, 2004). In a study conducted in Iran, gender specific differences in overweight/obesity prevalence were partly attributed to differences in level of physical activity between males and females. In the study, females were significantly less physically active compared to males (Hajian-Tilaki & Heidari, 2007). Similarly, in this study, further analysis showed that a significantly lower proportion of women (17.6%) engaged in vigorous physical activities compared to a males 40.5% $p = 0.002$, this could also partly contribute to the association observed between gender and overweight/obesity. More often within the African context, overweight or obese women are considered beautiful (Supa & Linda, 2011). The perception of overweight and obesity as a sign of beauty and not manifestation of a chronic disease fuels increase of the problem among women. It is not clearly understood whether female healthcare workers in Kenya have such a perception.

Average monthly income which was used as an indicator of socio-economic status is not associated with overweight/obesity (p = 0.403). The finding is contrary to similar studies done in developing countries which have found socio economic status to be positively associated with overweight/obesity (KNBS, 2010a; McLaren, 2007; Shayo & Mugusi, 2011). The target population in this study was a fairly homogenous group in terms of socio-economic status, indeed, a greater proportion of respondents' monthly average income fell within a narrow range (median 47, 000 IQR 56000 – 30000), therefore this could mainly explain why socio-economic status was not associated with overweight/obesity.

Parity is not significantly associated with overweight/obesity in this study. This finding is in contrast with some previous studies that have reported a significant association. In a study conducted in England, parity was associated with long term weight gain among women of child bearing age (Harris, Ellison, Holliday, & Lucassen, 1997). Such a finding was also reported in a longitudinal study among Finnish women in which women with 3 or more children were significantly more likely to be overweight or obese compared to those with 2 or less children (Luoto *et al*., 2011). In Sub-Saharan Africa, influence of parity on overweight has not received extensive research as in developed countries. Population surveys conducted in Nigeria and Tanzania reported an association between parity and overweight (Okoh, 2014; Shayo & Mugusi, 2011). There were differences in parity measurement among these studies that could account for differences in results, whereas the Finnish and English studies measured parity by determining number of pregnancies a female has had, the remaining studies measured parity by determining number of children a female respondent has had.

Studies investigating the relationship between marital status and overweight/obesity have reported mixed results. In this study, marital status is significantly associated with overweight in bivariate analysis but this factor was not an independent predictor. A similar result was also reported in a study conducted in Tanzania where marital status was also significantly associated with overweight in bivariate analysis but not in multivariate analysis (Shayo & Mugusi, 2011). To the contrary, a longitudinal study in USA reported that marriage was associated with a significant 2-year weight gain, and divorce with a significant 2-years weight loss (Jeffery & Rick, 2002). Likewise in a national representative population survey in Greece involving 17341 adults, married persons had a significantly higher prevalence of overweight/obesity (Tzotzas *et al*., 2010). There are several factors that could confound the relationship between marital status and overweight /obesity such as age and level of physical activity. One study conducted in Iran involving 89405 participants controlled for age and physical activity, but still found an association between marital status and overweight/obesity (Janghorbani *et al*., 2008). The difference in results could be attributed to methodological approaches between these studies; whereas the other studies sampled respondents from the general population, respondents in this study were sampled from a population subgroup.

Area of residence is not associated with overweight and obesity. The similar prevalence rates found among healthcare workers living in both urban and rural areas is in contradiction with population based surveys done in Kenya that have consistently reported higher prevalence of overweight among residents of urban areas (Christensen *et al*., 2008; KNBS, 2010a). Studies conducted in other African countries like Uganda, Mozambique, and Malawi have also consistently reported a significantly higher prevalence of overweight and obesity among residents of urban areas (Gomes *et al*., 2010; Kirunda *et al*., 2015; Msyamboza *et al*., 2013). The target population in this study is a fairly

homogenous group, it is therefore more likely that healthcare workers had similar lifestyle regardless of their area of residence hence no significant differences in overweight/obesity prevalence which is highly influenced by the lifestyle choices.

Religion is not associated with overweight/obesity, this is contrary to similar studies conducted elsewhere. In a larger scale study conducted in USA, church members participating in the Pawtucket Heart Health Program were more likely than people who were not church members to be overweight or obese (Lapane, Lasater, Allan, & Carleton, 1997). Using state-level ecological data and a national sample of adults in USA it was found that there were significantly more obese individuals in states with a higher proportion of persons claiming religious affiliation, and in states with a higher proportion of Baptists (Ferraro, 1998). Using individual-level data, the same study also found that religious practice was positively associated with overweight and obesity (Ferraro, 1998). Compared to this study, both the American studies were large scale in design and this could account for the differences in results.

Even though a greater proportion of respondents who reported to be having an overweight/obese close family member are overweight or obese, this is not statistically significant. The result is in variance with previous studies. There is evidence from observational studies that overweight and obesity tend to run in families (Lowe *et al*., 2015; Sahin *et al*., 2011). On the other hand, some biological studies have identified specific genes that raise the risk of developing overweight and obesity in case of exposure to an adverse environment (Lindi *et al*., 2002; Meirhaeghe *et al*., 2000). According to WHO (1997), genetical inheritance can influence body weight status as genes involved in weight gain increase the risk of susceptibility of an individual to the development of obesity when

exposed to an adverse environment. The variance of results in this study could therefore be attributed to differentials in socio-economic and environmental settings existing in both the developed countries and Kenya.

5.3 Lifestyle Factors Associated with Overweight and Obesity

Vigorous physical activity is associated with overweight/obesity but it is not an independent predictor. Other lifestyle factors including moderate physical activity, walking from place to place and number of hours spent sitting per day are not independently associated with overweight and obesity. Contrary to the findings of this study, engaging in physical activity has been linked to lower risk of overweight and obesity in previous studies (Hajian-Tilaki & Heidari, 2007; Mayega *et al*., 2012; Okeyo *et al*., 2009). These studies did not control for important socio-demographic characteristics such as age that may affect interpretation of its results, it is therefore not clear whether physical activity was independently associated with overweight and obesity. This could partly account for the differences in results.

The proportion of current smokers is too low in this study, only 1 out of 165 respondents reported to be currently smoking. The prevalence rate of smoking in this study was lower compared to the prevalence rate of 19% and 2% among males and females respectively reported in the Kenya Demographic and Health Survey of 2008 (KNBS, 2010a). Due to the low smoking prevalence rate in the study sample, an association between smoking and overweight/obesity could not be statistically determined hence this factor was excluded from the bivariate analysis.

Amount and frequency of alcohol intake is not associated with overweight and obesity. Results from other studies investigating the relationship between alcohol intake and body weight greatly vary.

There are as well gender specific differences in direction of the association between alcohol and overweight/obesity. In a study carried out in Italy, alcohol intake was inversely associated with the risk of overweight or obesity among females (L. Wang et al., 2010). A positive association between alcohol intake and overweight among men but not women was reported in Finland (Lahti-Koski, Pietinen, Heliovaara, & Vartiainen, 2002). However, a study in Italy found no association between alcohol intake and overweight/obesity (Tavani, Negri, & La Vecchia, 1994). The variation in the results of these studies could be attributed to differences in target populations, sample sizes used and lack of a standard measure of alcohol intake among study participants across the studies.

There have been mixed results from studies investigating the link between inadequate sleep and overweight/obesity. For adults, sleep time of between 7 -8 hours is considered adequate, while sleep time of less than 7 hours is inadequate (Gangwisch et al., 2005). Number of hours slept are not associated with overweight and obesity in this study. Similar finding has been reported in previous cross sectional surveys (Lauderdale *et al*., 2006; Ohayon, 2004). However, some cross sectional studies have reported a positive association between short sleep duration and overweight/obesity in males and females (Shigeta *et al*., 2001; Vioque *et al*., 2000), while others have reported an association in men but not in women (Heslop *et al*., 2002). Results from longitudinal prospective studies have consistently found an association between inadequate sleep and overweight/obesity (Gangwisch *et al*., 2005; Patel *et al*., 2006). As such, methodological differences in the studies could account for the variation in results partly.

Doing night shift work is not significantly associated with overweight and obesity. This finding is consistent a similar study conducted among male workers at two plants in Sweden which reported no

association between shift work and overweight/obesity (Karlsson *et al*., 2003). However, other studies have reported contrary results, which can partly be attributed to differences in study design and sampling. A prospective longitudinal study with 469 participants that incorporated two 5-year periods in England, reported that weight gains exceeding 5 and 7 kg were more frequent in nurses on night shift work compared to daytime work (Niedhammer *et al*., 1996). Another study conducted among 2086 female Australian nurses found an association between shift work and overweight/obesity (Zhao *et al*., 2012). On the other hand, an analysis of data from the fourth and the fifth Korea National Health and Nutrition Examination Survey 2008-2011 (Son *et al*., 2015) found a significantly increased risk of overweight/obesity among shift workers.

5.4 Psycho-social Factors Associated with Overweight and Obesity

There is no association between stress level and overweight/obesity, however, majority of respondents report moderate to high levels of stress. There is no conclusive evidence on the association between stress and overweight/obesity as studies on the subject have reported mixed results. A cross sectional survey of 45810 Finnish employees found no association between stress and overweight/obesity (Kouvonen *et al*., 2005). On the other hand, a large scale study conducted in Canada involving 112,716 respondents reported an increased risk of obesity in both male and female respondents with stress (Chen & Qian, 2012). Different results were reported in a 13 year follow up study conducted in the USA where an association between high baseline stress and overweight/obesity was reported among women but not men (Fowler-Brown *et al*., 2009). The contrasting results could be attributed to different factors; first, a similar tool was not used to measure stress across all studies, and secondly different types of stress were investigated namely, work related stress, lifetime stress and adverse psychosocial exposure stress.

With regard to perception, there is an association between underestimation of own BMI status and overweight/obesity. This finding is consistent with similar studies conducted in Kenya, Nigeria and South Africa (Akinpelu *et al*., 2015; Ettarh *et al*., 2013; Supa & Linda, 2011). Regardless of objectively measured BMI, perceived BMI status is an important factor in aetiology of overweight/obesity because it more often predicts weight loss behavior (Strauss, 1999). Whereas persons who underestimate their BMI status are less likely not engage in weight loss behaviour, those who overestimate their BMI status regardless of their actual BMI are more likely to engage in weigh loss behaviour hence the have a lower risk overweight and obesity (Hidalgo-Rasmussen *et al*., 2013). As overweight/obesity prevalence increases in the population, a greater proportion of persons are more likely to become unaware of the problem and thus tend to underestimate their body weight as is evident from this study (Johnson-Taylor, Fisher, Hubbard, Starke-Reed, & Eggers, 2008). Body weight self-perception is influenced greatly by social circle interactions. In a high prevalence environment, persons tend to perceive overweight/obesity as normal, they are also more likely to subjectively use body sizes of those around them as reference points instead of measurements recommended by World Health Organization for use in clinical classification of body weight (Alli, Amialchuk, & Renna, 2011).

A significantly higher proportion of those who are overweight or obese are dissatisfied with their own body weight. This is consistent with studies conducted in the USA where dissatisfaction with own body weight status was associated with being or obese or overweight (Anderson, Eyler, Galuska, Brown, & Brownson, 2002a; Kuk et al., 2009). Inherent weakness of all these studies is their inability to establish temporal relationship between satisfaction with own body weight and overweight/obesity. Satisfaction with own body weight is an important variable especially in

overweight/obesity control interventions, studies have found that adult persons dissatisfied with their weight status are more likely to adopt and maintain weight loss behavior compared to those satisfied with their own weight (Anderson et al., 2002b; Green et al., 1997).

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter presents conclusion, recommendations and suggestions for further research

6.2 Conclusion

6.2.1 Socio-demographic Factors Associated with Overweight and Obesity

Gender, age and marital status were significantly associated with overweight/obesity, however age was the only independent predictor of overweight and obesity. Other factors namely religion, socio-economic status, residence, parity and family obesity history were not significantly associated with overweight and obesity.

6.2.2 Lifestyle Factors Associated with Overweight and Obesity

Vigorous physical activity is significantly associated with overweight/obesity though is not an independent predictor. Other lifestyle factors including alcohol consumption, number of hours slept per day, night shift work, moderate physical activity, walking to places and number of hours spent sitting per day are not significantly associated with overweight and obesity.

6.2.3 Psycho-social Factors Associated With Overweight and Obesity

Perceived BMI status and satisfaction with own body are were significantly associated with overweight and obesity while stress level is not.

6.3 Recommendations

6.3.1 Recommendation for Policy Makers

i. There is need to plan and implement overweight/obesity prevention and control interventions among healthcare workers in Kisumu East Subcounty. Particularly, these interventions should be targeted at healthcare workers in higher age brackets who are the most affected group.

ii. Engaging in planned physical activity is one of the most effective ways in overweight prevention and control. Therefore, those participating in physical activities should be encouraged to continue doing so, while those not engaged in physical activities should be encouraged to start.

iii. Healthcare workers should to be sensitized on the need to be aware of their own body weight status as this will be the first critical step in behaviour change towards weight loss or control programs. On the other hand, healthcare workers should more especially be reminded of the health risks associated with overweight/obesity some of those who were overweight/obese expressed satisfaction with their own body weight.

6.3.2 Recommendation for Further Research

i. Further studies to investigate occurrence of overweight/obesity co-morbidities such as diabetes, hypertension, cardio-vascular diseases and cancers among this group need to be done inorder to inform prevention, control and treatment interventions.

ii. There is also need to conduct larger scale quantitative and qualitative studies to understand and triangulate association between overweight/obesity and socio-demographic, lifestyle and psychosocial factors.

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APPENDICES

Appendix I: Consent Form

Evaluation of Prevalence and Factors Associated With Overweight Among Health Care Workers in Kisumu East Sub-county Kenya Study.

Dear participant,

You have been selected to participate in this study. The purpose of the study is to quantify and document the risk and predictors of overweight and obesity among healthcare workers in Kisumu East sub-county. This study will generate baseline data to bridge the gap of knowledge in the extent and predictive factors of excessive body weight among health care workers in Kisumu east Sub-county and Kenya in general. The study findings will form the basis of designing and implementing appropriate and targeted overweight prevention and control strategies among the healthcare workforce by the Ministry of health and other interested stakeholders in Kenya. This will contribute towards reduction of lifestyle related diseases and improvement of health status of the health care work force in the country.

What will be required of you: You will fill a questionnaire which will take you about 30 minutes. Thereafter, your height will be taken using a height measuring bar, weight will be taken using an electronic weighing scale and body fat percentage will be taken using a Body Fat Meter. All the measurements are non-invasive and pose no risk to your health.

Risks and benefits: There are no risks posed by this study, however you may find some of the questions about your lifestyle sensitive. There are no direct benefits accruing from participating in this research but, findings of this research will help the Ministry of Health and other interested

stakeholders in designing and implementing appropriate interventions geared at improving health status of healthcare workers.

Your answers will be confidential: The information you will give will be kept strictly confidential. Any information identifying you will not be included in the questionnaire. Study records will be kept in a locked file; only the researchers will have access to the records.

Taking part is voluntary: Taking part in this study is completely voluntary. You may skip any question that you do not want to answer, however we will appreciate if you respond to all questions. You can also decline to participate in the study or withdraw consent to participate at any time without reprisal.

If you have questions: If you have any questions, you can direct them to the researcher Zachary Masimba, cell phone number 072058645 or supervisors of this study, Dr. Christine Agatha cell phone number 072058645, and Dr. David Okeyo cell phone number 0723471371. If you have any questions or concerns regarding ethical considerations of this study, you can also contact Maseno University Ethical Review Committee on 057351622 ext. 3050 or muerc-secretariat@maseno.ac.ke. You will be given a copy of this form to keep for your records.

Statement of Consent: I have read the above information, and have received answers to any questions I asked. I consent to take part in the study.

Your name ……(optional)

Your signature……Date……

Appendix II: Maseno University School of Graduate Studies Approval

MASENO UNIVERSITY
SCHOOL OF GRADUATE STUDIES

Office of the Dean

Our Ref: PG/MPH/0161/2011

Private Bag, MASENO, KENYA
Tel:(057)351 22/351008/351011
FAX: 254-057-351153/351221
Email: sgs@maseno.ac.ke

Date: 18th February, 2014

TO WHOM IT MAY CONCERN

RE: PROPOSAL APPROVAL FOR ZACHARY MASIMBA ONDICHO—PG/MPH/0161/2011

The above named is registered in the Master of Public Health Programme of the School of Public Health and Community Development, Maseno University. This is to confirm that his research proposal titled "Evaluation of Prevalence and Factors Associated with Overweight among Health Care Workers in Kisumu East District, Kenya" has been approved for conduct of research subject to obtaining all other permissions/clearances that may be required beforehand.

DIRECTOR
18 FEB 2014
SCHOOL OF GRADUATE STUDIES

Dr. Pauline Andang'o
ASSOCIATE DEAN, SCHOOL OF GRADUATE STUDIES

Appendix III: Maseno University Ethics Review Committee Approval

MASENO UNIVERSITY ETHICS REVIEW COMMITTEE

Tel: +254 057 351 622 Ext: 3050
Fax: +254 057 351 221

Private Bag – 40105, Maseno, Kenya
Email: muerc-secretariate@maseno.ac.ke

FROM: SECRETARY - MUERC

DATE: 3rd April, 2014

TO: Mr. Zachary Masimba Ondicho
PG/MPH/00161/2011,
Department of Public Health,
School of Public Health and Community Development,
P. O. Box Private Bag, Maseno, Kenya.

REF: MSU/DRPC/MUERC/000063/14

RE: EVALUATION OF PREVALENCE AND FACTORS ASSOCIATED WITH OVERWEIGHT AMONG HEALTH CARE WORKERS IN KISUMU EAST DISTRICT. KENYA. PROPOSAL REFERENCE NO: MSU/DRPC/MUERC/000063/14

This is to inform you that the Maseno University Ethics Review Committee (MUERC) determined that the ethics issues raised at the initial review were adequately addressed in the revised proposal. Consequently, the study is granted approval for implementation effective this 3rd day of April, 2014 for a period of one (1) year.

Please note that authorization to conduct this study will automatically expire on 2nd April, 2015. If you plan to continue with the study beyond this date, please submit an application for continuation approval to MUERC Secretariat by 1st March, 2015.

Approval for continuation of the study will be subject to successful submission of an annual progress report that is to reach MUERC Secretariat by 1st March, 2015.

Please note that any unanticipated problems resulting from the conduct of this study must be reported to MUERC. You are required to submit any proposed changes to this study to MUERC for review and approval prior to initiation. Please advice MUERC when the study is completed or discontinued.

Thank you.

Yours faithfully,

Dr. Bonuke Anyona,
Secretary,
Maseno University Ethics Review Committee.

DIRECTORATE OF RESEARCH PUBLICATION & CONSULTANCIES 03 APR 2014 MASENO UNIVERSITY

Cc: Chairman,
Maseno University Ethics Review Committee.

MASENO UNIVERSITY IS ISO 9001:2008 CERTIFIED

Appendix IV: Jaramogi Oginga Odinga Teaching and Referral Hospital Ethical Review Committee Approval

MINISTRY OF HEALTH

Telegrams: "MEDICAL", Kisumu
Telephone: 057-2020801/2020803/2020321
Fax: 057-2024337
E-mail: ercjootrh@gmail.com
When replying please quote

JARAMOGI OGINGA ODINGA TEACHING & REFERRAL HOSPITAL
P.O. BOX 849
KISUMU

Ref: ERC.1B/VOL.1/117

Date 10th June, , 2014

Zachary Masimba Ondicho,
MASENO UNIVERSITY.

Dear Zachary,

RE: FORMAL APPROVAL TO CONDUCT RESEARCH TITLED: *"EVALUATION OF PREVALENCE AND FACTORS ASSOCIATED WITH OVERWEIGHT AMONG HEALTH CARE WORKERS IN KISUMU EAST DISTRICT, KENYA"*

The JOOTRH ERC (ACCREDITATION NO. 01713) has reviewed your protocol and found it ethically satisfactory. You are, therefore, permitted to commence your study immediately. Note that this approval is granted for a period of one year (10th June, 2014 to 11th June, 2015). If it is necessary to proceed with this research beyond the approved period, you will be required to apply for further extension.

Also note that you will be required to notify the committee of any protocol amendment(s), serious or unexpected outcomes related to the conduct of the study or termination for any reason.

Finally, note that you will also be required to share the findings of the study in both hard and soft copies upon completion.

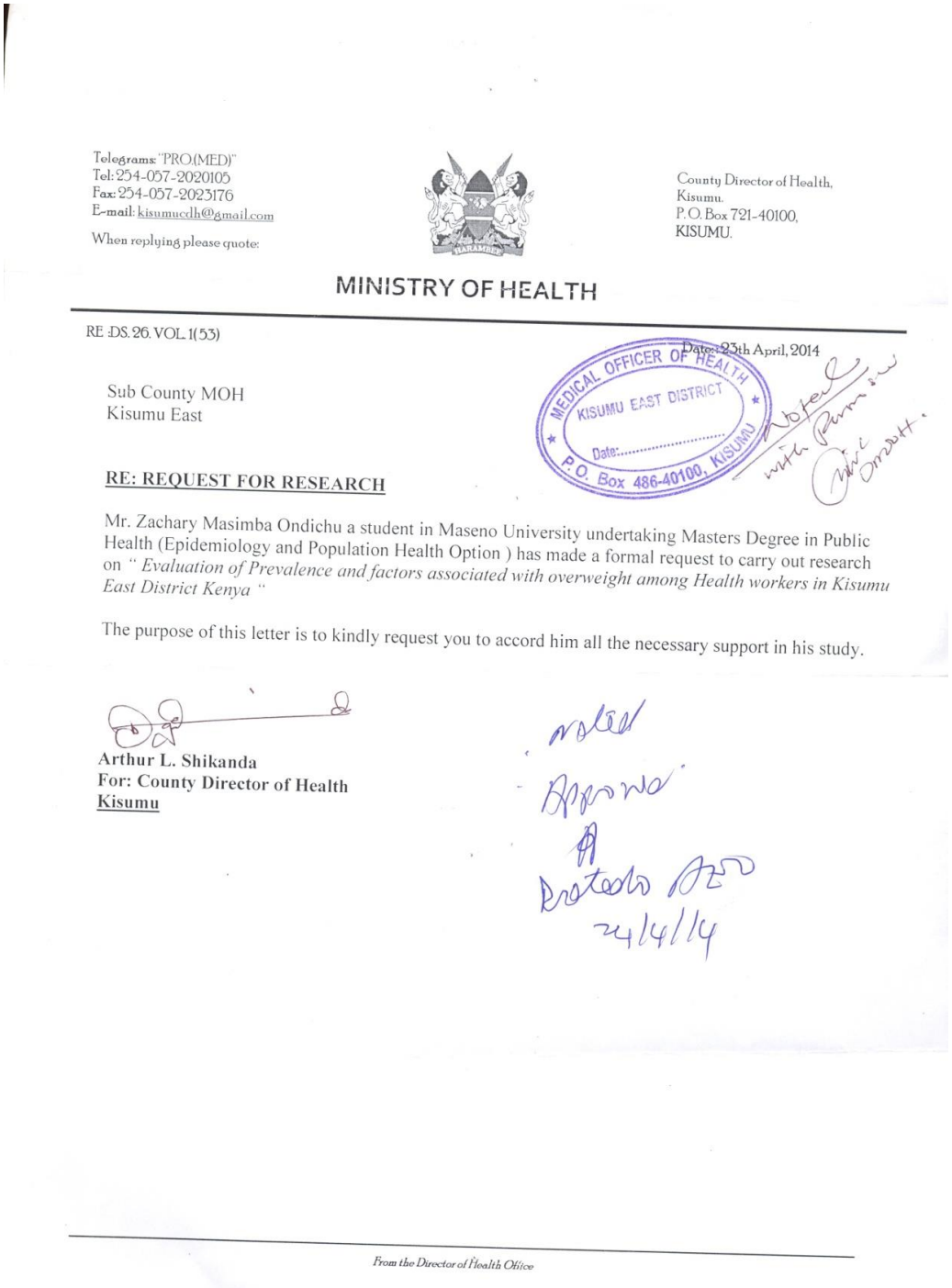
The JOOTRH ERC takes this opportunity to thank you for choosing this institution and wishes you the best in your endeavours.

Yours sincerely,

for

FRED O. AKWATTA,
SECRETARY – ERC,
JOOTRH – KISUMU.

Appendix v: Permission to Conduct this Study from the Director of Health - Kisumu County and Subcounty Medical Officer of Health – Kisumu East Subcounty.



Telegrams: "PRO (MED)"
Tel: 254-057-2020105
Fax: 254-057-2023176
E-mail: kisumucdh@gmail.com
When replying please quote:

County Director of Health,
Kisumu.
P. O. Box 721-40100,
KISUMU.

MINISTRY OF HEALTH

RE :DS. 26. VOL. 1(53)

Date: 23th April, 2014

MEDICAL OFFICER OF HEALTH
KISUMU EAST DISTRICT
Date:.....
P.O. Box 486-40100, KISUMU

Sub County MOH
Kisumu East

RE: REQUEST FOR RESEARCH

Mr. Zachary Masimba Ondichu a student in Maseno University undertaking Masters Degree in Public Health (Epidemiology and Population Health Option) has made a formal request to carry out research on *" Evaluation of Prevalence and factors associated with overweight among Health workers in Kisumu East District Kenya "*

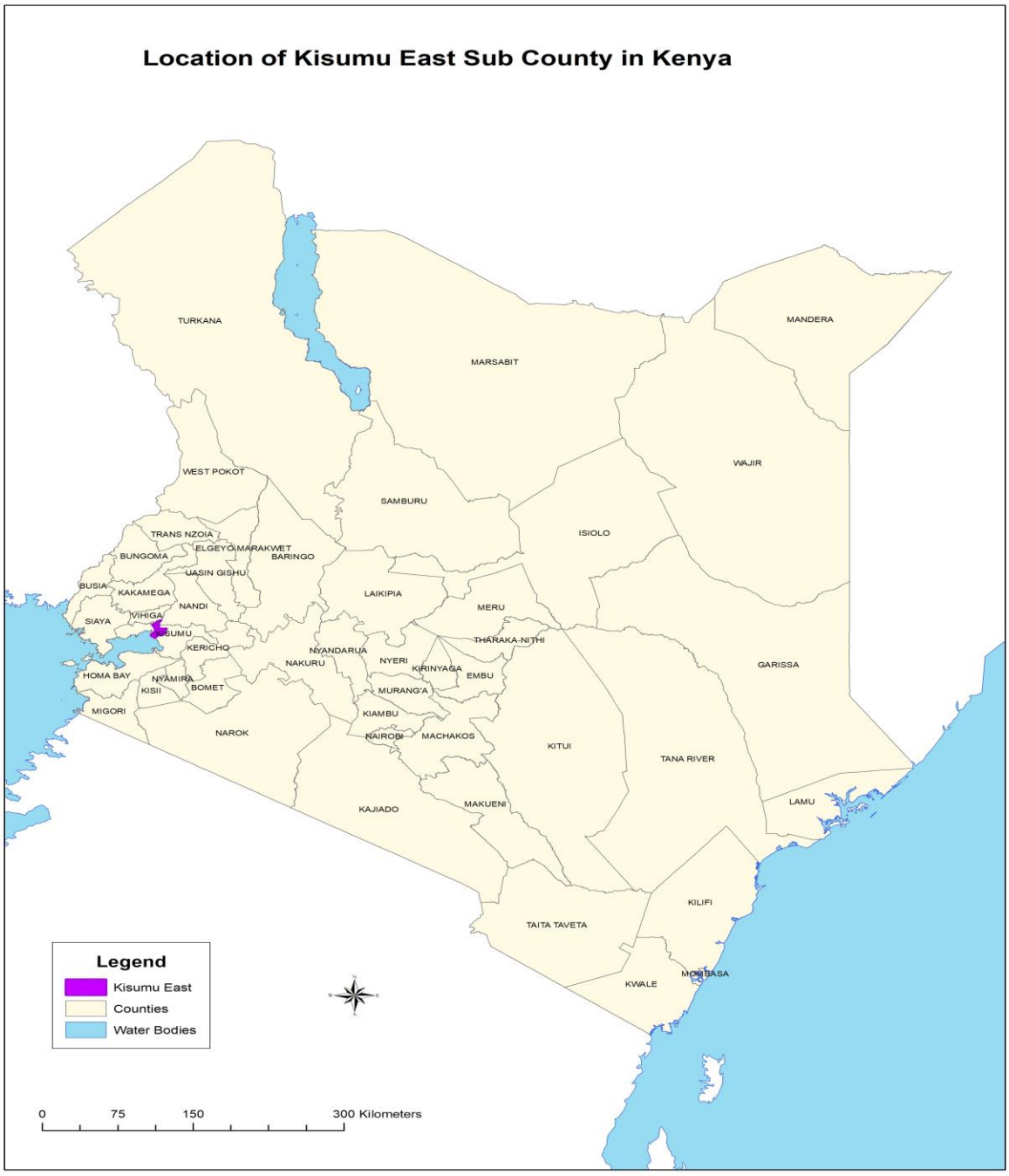
The purpose of this letter is to kindly request you to accord him all the necessary support in his study.

Arthur L. Shikanda
For: County Director of Health
Kisumu

noted
Approved
Protocols
24/4/14

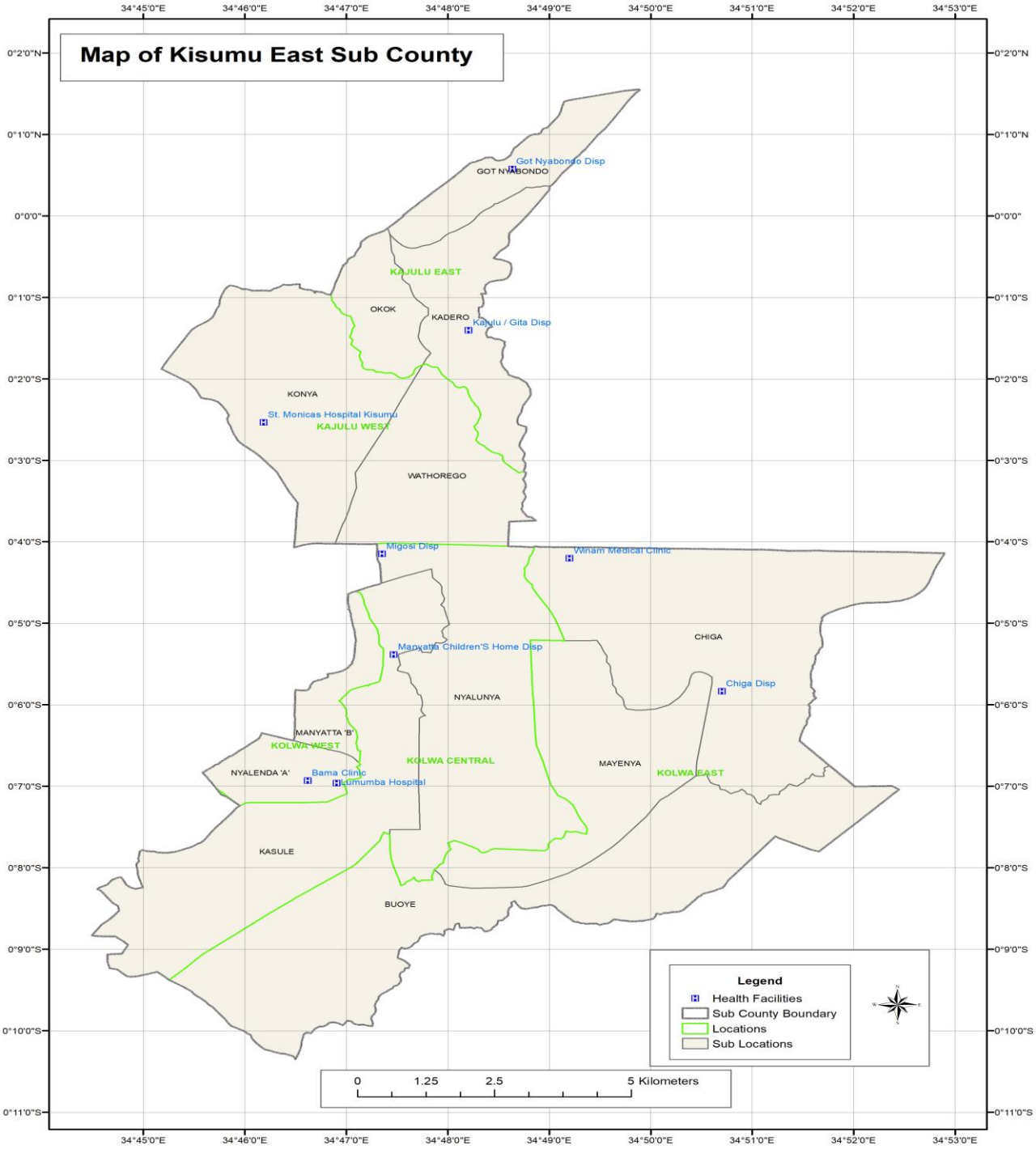
From the Director of Health Office

Appendix VI: Map of Kenya Showing Location of Kisumu East Subcounty



Adopted from Kenya National Bureau of Statistics

Appendix VII: Map of Kisumu East Subcounty



Adopted from Kenya National Bureau of Statistics

Appendix VIII: Population of Healthcare Workers per Cadre in Each Health Facility in Kisumu East Subcounty

Health Facility	Professional Cadre															
	Doctors	Medical social workers	Counselors	Health records officers	Oral health officers	Medical engineers	Health ad-ministrative officers	Clinical officers	Nurses	Lab technolo-gists	Nutrition officers	Public health officers	Radiographers	Occupational therapists	Physiotherapists	Totals
Jaramogi Oginga Odinga Teaching & Referral Hospital	47	17	13	9	2	5	3	41	255	42	16	18	5	6	8	**487**
Kisumu East District Hospital	21	12	8	5	7	2	2	19	85	11	4	8	4	0	5	**193**
Rabuor Health Center	1	1	2	0	2	0	0	4	6	2	2	2	0	0	0	**22**
Nyang'ande Health Center	0	0	0	0	1	0	0	1	4	5	0	1	0	0	0	**5**
Hongo-Ogosa Health Center	0	0	1	0	0	0	0	2	3	2	0	2	0	0	0	**10**
Nyalunya Health Center	0	0	0	0	0	0	0	2	2	1	0	1	0	0	0	**6**
Kodiaga Prison Health Center	0	2	0	0	0	0	0	3	10	3	1	1	0	0	0	**20**
Ober Kamoth Health Center	0	1	1	0	0	0	0	2	9	2	0	2	0	0	0	**17**
Migosi Health Center	0	1	1	0	0	0	0	2	4	3	0	3	0	0	0	**14**
Kibos S.R. Dispensary	0		0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
Railway dispensary	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
Orongo dispensary	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
Police line dispensary	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
AP line dispensary	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
Simba Upepo dispensary	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
Got Nyabondo Dispensary	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
Chiga dispensary	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
Kowino dispensary	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
Totals	**69**	**34**	**26**	**14**	**12**	**7**	**5**	**77**	**386**	**71**	**23**	**38**	**9**	**6**	**13**	783

Appendix IX: Kth Number of Healthcare Workers by Cadre in Each Health Facility

Health facility	Professional cadre														
	Doctors	Medical social workers	Counselors	Health records officers	Oral health officers	Medical engineers	Health administrative officers	Clinical officers	Nurses	Lab. technologists	Nutrition officers	Public health officers	Radiographers	Occupational therapists	Physiotherapists
Jaramogi Oginga Odinga Teaching & Referral Hospital	3	2	1	2	0	3	2	5	3	2	2	1	2	1	1
Kisumu East District Hospital	2	2	1	2	1	0	0	2	3	3	2	0	1	0	3
Rabuor Health Center	0	0	1	0	0	0	0	1	3	0	0	1	0	0	0
Nyang ande Health Center	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0
Hongo-Ogosa Health Center	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Nyalunya Health Center	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Kodiaga Prison Health Center	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Ober Kamoth Health Center	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Migosi Health Center	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0

Appendix X: Questionnaire

QUESTIONNAIRE OF THE SURVEY ON PREVALENCE AND FACTORS ASSOCIATED WITH OVERWEIGHT AMONG HEALTH CARE WORKERS IN KISUMU EAST SUB-COUNTY, KENYA.

Hallo, my name is Zachary Masimba Ondicho, a student in Maseno University, School of Public Health and Community Development. I am conducting the above mentioned survey in Kisumu East Sub-county as a requirement for the award of Master of Public Health Degree. You have been selected to participate in this research. Participation in the research is voluntary and it will not cause any harm to you. However, your participation in the study is very important as findings will inform design of appropriate health promotion interventions among the healthcare workforce. The information you give will be strictly kept confidential and results of the research will be generalized and not refer to any particular individual.

This questionnaire is divided into 3 sections. Section A is on demographic and lifestyle, section B is about physical activities and section C comprises of anthropometric measurements. There are instructions preceding section A and B. For clarity purpose, there are additional instructions in every question. Please respond to the following questions by circling the appropriate response. Please note that there is no correct or wrong response.

QUESTIONNAIRE SERIAL NO……

SURVEY INFORMATION

	Location and Date	**Response**
1	Health facility ID	
2	Interviewer ID	
3	Date of completion	(ddmmyy)
4	Time of completion	…… AM/PM

SECTION A: DEMOGRAPHIC, BEHAVIORAL AND LIFESTYLE MEASUREMENTS.

	QUESTION	**RESPONSES**
5	What is your gender? *(Circle the appropriate response)*	1. Male 2. Female
6 (a)	What is your age? *(Indicate by figures e.g. 20)*	……years
(b)	In which year were you born? *(Indicate by figures e.g. 1975)*	…….
7	What is your professional cadre? *(Circle the appropriate response)*	1. Medical doctor/pharmacist/dentist 2. Clinical officer 3. Nurse 4. Laboratory technologist 5. Nutritionist 6. Public health officer 7. Radiographer 8. Occupational therapist 9. Physiotherapist 10. Medical social work 11. Other (specify)……
8	In which year were you employed? *(Indicate by figures e.g. 1980)*	……*(yyyy)*
9	What is your marital status? *(Circle the appropriate response)*	1. Single 2. Married 3. Divorced 4. Separated 5. Widowed

10	What is your religion? *(Circle the appropriate response)*	1. Protestant 2. Catholic 3. Muslim 4. Seventh Day Adventist 5. Doesn't belong to any religion 6. Other (Specify)……..
11	What is your household's average monthly income in Ksh? *(Circle appropriate answer)*	1. 0 – 50000 2. 50001 – 100000 3. Over 100000
12	How could you describe your area of residence *(Circle appropriate answer)*	1. Urban 2. Rural
13	**(*For female respondents only)*** How many pregnancies have you had in your lifetime? *(Circle appropriate answer)*	None 1 2 3 4 or more
14	***(For female respondents only)*** Are you currently pregnant?	1. Yes 2. No
15	Is any of your close relative (father, mother, brother or sister) obese?	1. Yes 2. No
Lifestyle and behavioral measurement		
16	Do you currently smoke any tobacco product? *(Circle the appropriate response)*	1. Yes 2. No *(if no, go to question 20)*
17	Do you currently smoke tobacco products daily? *(Circle the appropriate response)*	1. Yes 2. No
18	How old were you when you started smoking? *(Indicate by figures e.g. 20)*	

		……..years
19	On average, how many cigarettes do you smoke daily? *(Indicate by figures e.g. 20)*	……..cigarettes
20	In the past, did you ever smoke daily? *(Circle the appropriate response)*	1. Yes 2. No *(If no, go to question 22)*
21	How old were you when you stopped smoking? *(Indicate by figures e.g. 20)*	……..years
22	Have you ever consumed an alcoholic drink such as beer, wine, spirits, vodka or *changaa*? *(Circle the appropriate response)*	1. Yes 2. No *(if no, go to question 28)*
23	Have you consumed an alcoholic drink within the past 12 months? *(Circle the appropriate response)*	1. Yes 2. No *(If no, go to question 28)*
24	During the past 12 months, how frequently have you had at least one alcoholic drink? *(Circle the appropriate response)*	1. Daily 2. 5-6 days per week 3. 1-4 days per week 4. 1-3 days per month
25	Have you consumed an alcoholic drink within the past 30 days? *(Circle the appropriate response)*	1. Yes 2. No
26	During the past 30 days, on how many days did you have at least one alcoholic drink? *(Circle the appropriate response)*	1. 1-5 days 2. 6-10 days 3. Over 10 days
27	During the past 30 days when you drank alcohol, how many standard alcoholic drinks did you have during one drinking occasion on average? *One standard alcoholic drink is equivalent to 1 standard bottle of regular beer -300ml or 1 single measure of spirits - 30ml or I medium size glass of*	1. 1-4 drinks 2. 5-8 drinks 3. More than 8 drinks

	wine – 120 ml *(Circle the appropriate response)*	
28	How many hours do you sleep in a typical day? *(Circle the appropriate response)*	1. Less than 4 hours 2. 4 - 5 hours 3. 6 -7 hours 4. 8 or more hours
29	How do you perceive your own body weight? *(Circle the appropriate response)*	1. Underweight 2. Normal weight 3. Overweight 4. Obese
30	Are you satisfied with your body weight? *(Circle the appropriate response)*	1. Yes 2. No
31	Thinking about the amount of stress in your life, would you say that most days are *(Circle the appropriate response)*	1. Not at all stressful 2. Not very stressful 3. A bit stressful 4. Quite a bit stressful 5. Extremely stressful
32(a)	Do you do night shift work? *(Circle the appropriate response)*	1. Yes 2. No *(if no, go to question 35)*
(b)	In a typical week, how many days do you do night shift work? *(Circle the appropriate response)*	1. 1 2. 2 3. 3 4. 4 or more days
(c)	In a typical month, how many weeks do you do night shift work? *(Circle the appropriate response)*	1. 1 2. 2 3. 3 or more weeks

SECTION B. PHYSICAL ACTIVITIES

This section is about the time you spend doing different physical activities in a typical week, please answer the questions even if you do not consider yourself a physically active person. In answering the following questions, 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate.

Recreation activities		
33	Do you do any vigorous-intensity sports, fitness or recreational *(leisure)* activities that cause large increases in breathing or heart rate like running or football? *(Circle the appropriate response)*	1. Yes 2. No *(if no, go to question 38)*
34	In a typical week, how many days do you do vigorous-intensity sports, fitness or recreational *(leisure)* activities? *(Indicate by figures e.g. 2)*	……days
35	How many minutes do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day? *(Indicate by figures e.g. 20)*	……minutes
36	Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate such as brisk walking, cycling, swimming or volleyball*?* *(Circle the appropriate response)*	1. Yes 2. No *(if no, go to question 43)*
37	In a typical week, how many days do you do moderate-intensity sports, fitness or recreational *(leisure)* activities? *(Indicate by figures e.g. 2)*	……..days
38	How many minutes do you spend doing moderate-intensity sports, fitness or recreational *(leisure)* activities	…….minutes

	on a typical day? *(Indicate by figures e.g. 20)*	
The following questions are about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship.		
39	Do you walk or cycle to and from places e.g. work, shopping, market or place of worship? *(Circle the appropriate response)*	1. Yes 2. No *(if no, go to question 46)*
40	In a typical week, how many days do you walk or cycle to get to and from places? *(Indicate by figures e.g. 20)*	……*days*
41	How many minutes do you spend walking or cycling for travel on a typical day? *(Indicate by figures e.g. 20)*	…….*minutes*
The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent sitting at a desk, sitting with friends, travelling in car, bus, reading, or watching television, but do not include time spent sleeping.		
42	How many hours do you usually spend sitting or reclining on a typical day?	1. 1-4 hours 2. 4-8 hours 3. More than 8 hours

SECTION C: ANTHROPOMETRIC MEASUREMENTS

(To be filled by research assistant or investigator)

43. Height……..cm

44. Weight……..kg

45. BMI……..

46. Body Fat Percentage……

Thank you for your time and response.