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COLLEGE OF HEALTH SCIENCES

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LEVEL OF PHYSICAL ACTIVITY AND THE PREVALENCE OF RISK FACTORS OF NON-COMMUNICABLE DISEASES AMONG STAFF OF THE UNIVERSITY OF GHANA

BY

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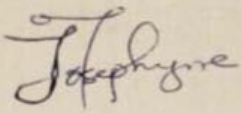
DECLARATION

I, Josephyne Tettey, do hereby declare that, apart from references made to the work done concerning this subject area which have been duly acknowledged, this work was independently done by me under supervision. I further declare that this work has not been submitted in whole nor part for the award of any degree in this university or elsewhere.



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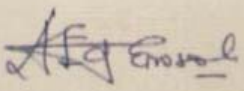

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Prof Alfred E. Yawson

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DEDICATION

This dissertation is dedicated to my dearly beloved mother for her tireless love and support.

ACKNOWLEDGEMENT

I would like to thank the staff of the University of Ghana who were willing to participate in this research, without their assistance, I would not have completed this study.

To my supervisor, Prof Alfred E. Yawson, I am grateful for the empathetic assistance and guidance.

I would also thank my entire family and friends for their consistent help.

Above all, I thank my Lord, and savior Jesus Christ for His favor which has seen me through.

I am immensely grateful.

ABSTRACT

Background: Non-communicable diseases, commonly cardiovascular disease, diabetes, respiratory conditions, and cancers, have become a major health challenge globally. They tend to develop gradually over time in people with some identified risk factors. Worldwide each year, 3.2 million deaths occur due to insufficient physical activity. In Ghana, there is an estimated 86,200 deaths in a year due to non-communicable diseases with 55% of the fatality occurring in people under 70 years.

The age of onset of non-communicable diseases has been falling globally with these diseases ranking highest on the cause of death in most parts of the world. In Ghana as well as other low- and middle-income countries, there is a rise in the prevalence of the diseases which can be attributed to globalization, rapid unplanned urbanization, aging population, and lifestyle modification including physical inactivity, tobacco use, unhealthy dietary choices, raised blood pressure, overweight, obesity, and raised blood lipids.

Objective: The objective of this study was to assess the level of physical activity and the prevalence of risk factors for non-communicable diseases among the staff of the University of Ghana.

Methods: In an observational cross-sectional study design involving 210 staff of the University of Ghana interviewed using a self-administered questionnaire at the University Hospital, Legon. Data on levels of physical activity and the prevalence of risk factors of non-communicable diseases were collected. Independent t-test of the means, Chi-square test, and logistic regression analysis were used at a 5% level of significance in analyzing the collected data in Stata version 14.

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LIST OF ABBREVIATIONS

AHF - American Heart Foundation

BMI - Body Mass Index

CI - Confidence interval

Covid-19 - Coronavirus 2019

CVD - Cardiovascular Disease

DALY – Diability-Adjusted Life Years

DBP – Diastolic Blood Pressure

ERC - Ethical Review Committee

GDHS - Ghana Demographic and Health Survey

GHO - Global Health Observatory

GHS - Ghana Health Service

GPAQ - Global Physical Activity Questionnaire

HDL - High-Density Lipoprotein

IPAQ - International Physical Activity Questionnaire

LDL - Low-Density Lipoprotein

LMIC – Low- and Middle-Income Countries

MET – Metabolic Equivalent

MDG - Millennium Development Goals

NCDs – Non-Communicable Diseases

OR - Odds Ratio

PA - Physical Activity

PE - Physical Education

QALY – Quality-Adjusted Life Years

SBP – Systolic Blood Pressure

SD - Standard Deviation

SDG – Susutainable Development Goal

T2DM - Type 2 Diabetes

UN - United Nations

WHO - World Health Organization

WHR-WorldHealthReport

YLD - Years Lived with Disease

CHAPTER ONE

INTRODUCTION

1.1 Background

Physical activity (PA) is a term that has been used interchangeably with exercise and physical fitness by many people. These terms refer to different concepts that are related to PA. PA is any all body skeletal muscle movements which require the expenditure of energy and is done in a social or cultural setting. This involves activities related to work, household activities, transportation to and from places, and leisure activities unlike exercise which is planned, structured, and repetitive to improve a specific component of physical fitness (World Health Organization, 2018)

Physical activity advocacy has been on the rise globally as the practice has proven to be a cost-effective means of preventing non-communicable diseases (NCD). There is strong evidence indicating that PA, directly and indirectly, prevents the major NCD which are causing a plague of premature death and disability (Reiner et al., 2013). Many nations including Ghana have devised guidelines with recommendations for achieving adequate levels of PA that offer tangible health benefits for individuals and the health system at large.

Recommended amounts of physical activity for an adult aged 18-64 years is 150 minutes of moderate-intensity PA or 75 minutes of vigorous-intensity PA throughout the week. Moderate-intensity PA includes brisk walking or cycling to work or for at least 10 minutes in a day, while vigorous-intensity physical activity includes jumping rope, running, climbing hills, cycling at more than 16 kilometers per hour (kph) (World Health Organization, 2018)

The benefits of PA in people of all ages have been well researched. The benefits span from physical, mental, social, and financial improvements in the individuals with attendant ease of burden on the health system. Studies have shown that there is an additive relationship between levels of physical activity and cognitive function across all ages, and an inverse relationship between PA and the risk of developing NCD. Brain function varies for different ages, yet PA is known to improve brain function and, in some cases, prevent debilitating diseases such as dementia as well. For young adults, regular PA is associated with improvement in general well-being as well as conflict management and peak cognitive performance (Voss et al., 2011). It is of essence to note that the benefits of regular physical activity or planned exercises do not alleviate the effects of prolonged sitting. Prolonged sitting for more than 8 hours results in the brain.

Noncommunicable diseases including cardiovascular disease (CVD), T2DM, respiratory conditions, and cancers have become a major health challenge globally. They account for significant levels of morbidity and mortality worldwide. The burden of these diseases is surging in developing countries amidst the existing albatross of communicable diseases and ill-health systems (Boutayeb & Boutayeb, 2005). In Ghana, there is an estimated 86,200 deaths annually due to non-communicable diseases, with 55% of the fatality occurring in people under 70years of age (Ministry of Health, 2012). Worldwide lack of physical activity accounts for 3 million deaths annually, about 10-16% of cases of breast cancer, colon, rectal cancers, T2DM, and 22% of ischaemic heart disease. Globally low- and middle-income countries (LMIC) account for 80% of deaths due to NCD. There is an expected rise of 1 in every 4 adults being diagnosed with NCD by 2020 globally (Milton et al., 2014) (World Health Organization, n.d.).

As much as there is increasing knowledge of the risk factors of NCD development and their prevention, there is a lack of comprehensive advocacy programs for health

promotion. Most countries including high-income countries have disease-focused programs or specific interventions for NCD prevention which does not include all the preventive measures. There needs to be a concise intervention for the control of NCD worldwide and in Ghana to help reduce the burden of these diseases on economies and improve individual's quality of life.

1.2 Problem Statement

The prevalence of NCDs is on the rise despite effective, research-proven preventive methods of avoiding the diseases. The rapidly changing lifestyles which predispose people to NCDs have been brought on by globalization, rapid unplanned urbanization, and population aging (Supakul et al., 2019). By virtue of the University of Ghana's location being a suburban location, it is expected that the demands of an urban lifestyle may affect the staff of the university in terms of work, transportation, and dietary choices. Like most suburbs, there may be dependence on automated transportation and reliance on high caloric fast food meals which will attenuate the problems of low physical activity of the health of the staff of the university (Konlan, 2019). Research from the University of Ghana Hospital which services staff and the general public shows that from 1979 to 2015, 60% of deaths within the period were due to NCDs. Most of the deaths were found to be from cardiovascular diseases (Sutherland et al., 2018).

There is a well-equipped sports complex available at a subsidised fee to the staff of the University of Ghana as well as well-paved and lit sidewalks for engaging in exercises. The University of Ghana however has no comprehensive strategy to increase health awareness and promote healthy choices among the staff. A strategy involving collaboration from all sectors of the university including professional and

nonprofessional sectors will be needed to make the university a health-promoting environment.

1.3 Research Question

What is the level of physical activity of the staff of the University of Ghana and what is the prevalence of risk factors of NCD among the staff of the University of Ghana?

STUDY OBJECTIVES

1.1.1 General Objective:

To determine the level of physical activity and associated risk factors of NCD among staff of the University of Ghana

1.1.2 Specific Objectives:

1. To assess the level of physical activity of staff of the University of Ghana
2. To examine the socio-demographic characteristics associated with physical activity of staff of the University of Ghana
3. To examine the association between risk factors of NCD and other factors on physical activity levels.

1.4 Justification

There is irrefutable evidence of the effectiveness of regular physical activity in the primary and secondary prevention of several chronic diseases and premature death. There is to be a linear relationship between physical activity and health status, where an increase in a person's physical activity levels will lead to additional improvement in health status.

The workers of the University of Ghana is in a suburban environment are exposed to a fast-paced life with its challenges. It is assumed that many of the workers have adopted a sedentary lifestyle in adapting to the demands of their environment.

Most of the diagnoses of NCD involve people between the ages of 30 to 64 years. These are the most productive years of a person's life, which greatly affects the years lived with disease (YLDs). Globally, each year 15 million people die from NCD between the ages of 30 and 69 years with over 85% of the deaths occurring in LMIC.

Thus, comprehensive advocacy for the prevention of NCD is urgently be needed.

1.5 Narrative Summary – Conceptual Framework

The causative factors of NCD are multifactorial and interconnected. There are risk factors that can be modified to reduce or increase the likelihood of acquiring the disease, and factors that cannot be modified. Among the modifiable risk factors are tobacco use, harmful use of alcohol, unhealthy diet, physical inactivity, overweight, obesity, raised blood pressure, raised blood sugar, and hyperlipidemia. Appropriately managing these risk factors can drastically reduce the likelihood of acquiring these NCD (Sharma et al., 2017). Non-modifiable risk factors of NCD include age, gender, and family history of NCD which form part of the sociodemographic data. Even though a person may have these non-modifiable risk factors, they can tremendously reduce their risk of developing NCD by controlling the modifiable risk factors. An enabling environment that is health-promoting may increase the likelihood of engagement in appropriate healthy behaviours which reduce the chances of developing NCD (Ranasinghe et al., 2015).

The risk factors may be metabolic changes that are quantifiable by anthropometric as well as biochemical measurements of a person or non-metabolic which are more external to the individual. The metabolic risk factors include overweight, obesity, raised blood pressure, raised blood sugar, and hyperlipidemia. Non-metabolic risk factors include tobacco use, harmful alcohol use, physical inactivity, and unhealthy diet (Farzadfar et al., 2011; Kim & Oh, 2013).

1.6 Conceptual Framework – Physical activity levels, and NCD risk factors

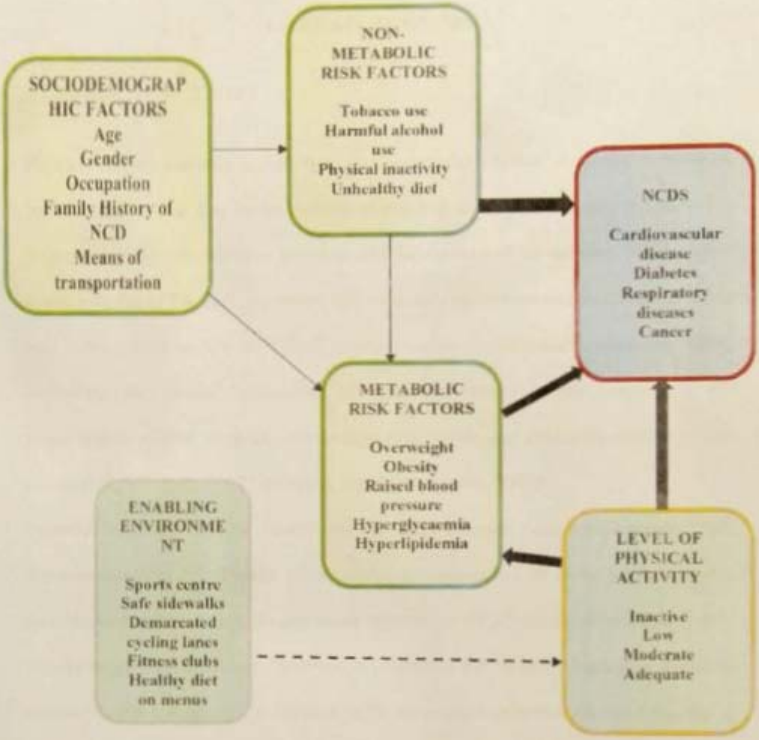

Figure 1 Conceptual Framework

CHAPTER TWO

LITERATURE REVIEW

2.1 PHYSICAL ACTIVITY

Physical activity involves any all body movement which results in energy expenditure by skeletal muscles. The health benefits of physical activity are directly related to the frequency of the activities, the intensity, and the duration of the activity. The gamut of health benefits of PA include primary and secondary prevention of chronic diseases and risk factors, such as CVDs, T2DM, obesity, cancer, hypertension, premature death, improving the general well-being of otherwise healthy people, minimizes the physiological effects of aging, improves mental health, and enhancing recovery from diseases (KING et al., 1992) (Morring, 2006) (Warburton, 2006).

Physical activity may be categorised as light-intensity, moderate-intensity, and vigorous-intensity PA. People often exhibit a combination of these intensity levels throughout the day. Many do not count themselves as physically active unless they partake in planned exercises. However, all forms of PA intensity have been found to improve health outcomes. The health benefits are more pronounced when the practice of PA is embedded in one's daily routine such as several light-intensity activities interspersed with moderate and vigorous-intensity activities. Light-intensity physical activity which can be intentionally incorporated into ones' daily routine includes walking slowly at about 5kmph, house chores such as dusting, washing dishes, changing bed sheets, vacuuming, watering plants, pruning, and preparing meals. Moderate-intensity PA includes raking, weeding, cycling, recreational swimming, table tennis, cleaning windows, unpacking the groceries, and brisk walking at 6kmph. Vigorous-intensity PA includes very brisk walking >7kmph, jogging, swimming laps,

cycling at >12kmph, moving heavy furniture, digging trenches, mowing the lawn with a hand mower, and lawn tennis(Gary & Simeon, 2007).

The PA recommendations for adults according to the WHO are 150minutes of moderate-intensity physical activity or 75mins of vigorous-intensity physical activity or an equivalent combination of both in a week as well as muscle endurance activities at least two times a week. These guidelines are helpful for policy formulation, and health promotion strategies. They were adopted as part of the WHO Global Strategy on Diet, Physical Activity, and Health. Ghana has adopted these recommendations by WHO in the NCD prevention and control program. (Oja & Titze, 2011) (Trost, Stewart G. Owen et al., 2002).

The Ghana Demographic and Health Survey (GDHS) 2008 showed that 41% of adults had not engaged in any vigorous-intensity PA within the last 7 days prior to conducting the survey. These changes are estimated to progressively worsen due to rapid unplanned urbanization, tobacco usage, population aging, decreasing levels of physical activity, and unhealthy dietary choices.

2.2 Global Physical Activity Levels

Physical activity levels were subjective to the researcher's tool over a long period until WHO introduced the Global Physical Activity Questionnaire in 2002 (Cleland et al., 2014). Using this assessment tool to standardise PA levels globally it was found that globally PA levels are diverse. The levels vary across age, sex, socioeconomic classes, and geographical locations. Adults from 122 countries were assessed from age 15years, and 31.1% of them were found to be physically inactive (Armstrong & Bull, 2006).

Physical inactivity levels have been found to rise with age. Among the sexes, women were found to be less physically active than men. People in high-income countries were found to have lower levels of physical activity (Hallal et al., 2012).

2.3 Non-Communicable Diseases

NCD are medical conditions that are by definition non-infectious and non-contagious diseases with a long duration. They are the result of a combination of genetic, physiological, environmental, and behavioural factors. The four main types of NCD include CVDs, cancer, chronic lung disease, and T2DM. CVDs are a group of disorders affecting the heart and blood vessels. Examples include heart attacks, strokes, rheumatic heart disease, deep vein thrombosis, and pulmonary embolism. They are the leading cause of deaths attributed to NCDs, accounting for 17.9 million deaths in 2016 that is representing 31% of all global deaths (de-Graft Aikins et al., 2012). Among this 31%, there are 85% of the deaths which are due to heart attacks and strokes. It is known that cancers account for 9.0 million deaths annually, while respiratory diseases caused by indoor and outdoor pollution, and T2DM, cause 3.9 million deaths and 1.6 million deaths respectively annually. All together the four major NCD are responsible for over 80% of "premature" deaths among people in the 30 to 69 years age bracket (Benjamin et al., 2019)

There is a communicable link in these diseases even though they are not directly transmitted from one person to another, or by an infectious agent. The communicability is shared among the social network of individuals, in that; an obese person is likely to influence their family, friends, and community with habits that promote obesity. Likewise, a physically active person is likely to influence their social circles to desire and begin to practice regular physical activity (Cockerham et al., 2017)

2.4 Biopsychosocial Approach to NCD Management

The biopsychosocial approach to disease prevention and management has been accepted as a holistic method and efficient. As part of WHO sustainable development goals (SDG), NCD control was recognized as a major contributor to sustainable development. The need to also consider mental health as a major NCD as well as a contributing factor to the outcome of disease management are also being elaborated. The agenda of the SDG target 3.4 is that by 2030 premature mortality from NCD should be reduced by one-third relative to 2015 levels, and to promote mental health and well-being. This was considered due to the shared risk factors underlying NCD and mental health disorders such as excessive alcohol use and another substance misuse. People living with NCD may also experience reduced income and early retirement due to the cost and care and the complications of the diseases thus an all-rounded approach was suggested to have the management of NCD to include mental health considerations. Thus health promotion and medical interventions are diversifying to consider a multi-sectoral approach with the anthropology of the people into consideration as well (Pikhar & Pikhartova, 2015; Stein et al., 2019; J. S. Yang et al., 2018).

2.5 Burden of Non-communicable Diseases in Ghana

Based on institutional data, the incidence of NCD is increasing as well as the deaths due to NCD in Ghana. Hypertension was ranked in the top five outpatient diseases for over 15years. In 2008, CVDs overtook malaria as the leading cause of death from institutions with 14.5% deaths while malaria accounted for 13.4% deaths.

WHO estimates that NCD accounts for 34% of deaths and 31% of the disease burden in Ghana. An estimated 86,200 people die from NCDs and 55.5% of them are below the age of 70years. About 70% of people diagnosed with hypertension are not on treatment and nearly half of them already have end-organ damage at the time of diagnosis implying a long-standing uncontrolled disease.

2.6 National Policy on Physical Activity/NCD

Ghana instituted the NCD control program with the vision of creating a healthy nation that lives longer with optimal physical and mental health. The program adopted the WHO guidelines for… The strategies to be implemented in the policy include:

1. Primary prevention by reducing exposure to the risk factors namely tobacco, unhealthy diet, physical inactivity, and alcohol abuse. Increasing physical activity through health promotion programs is a primary prevention strategy under the program's policies.
2. Early detection and clinical care of people who develop NCD.
3. Health system strengthening by training health workers and improving the human resource capacity; providing drugs and health essentials, integrating NCD plans into wider health system planning; and ensure financial support towards the fight against NCDs.
4. Improving research into NCD and development of the nation to facilitate NCD prevention.
5. Surveillance of the NCD and their risk factors to aid policy improvements.

The objectives of these strategies are to develop, support, coordinate, and monitor interventions to reduce modifiable risk factors.

2.7 Risk factors of Non-communicable Diseases

There are metabolic and non-metabolic risk factors contributing to the steady rise of NCD in LMIC. The metabolic risk factors include overweight, obesity, raised blood pressure, high blood sugar, and hyperlipidemia. While the non-metabolic risk factors include physical inactivity, tobacco use, and unhealthy diet (Olatona et al., 2018).

In Ghana, the burden of NCDs is projected to be increasing due to an aging population, rapid urbanization, and unhealthy lifestyles leading to increasing levels of metabolic risk factors including obesity, high blood lipids, and high blood pressure. Data from the National Policy for the Prevention and Control of Chronic NCDs in Ghana indicate that obesity among women of the reproductive age more than doubled from 13% to 30% in 2008. The proportion of children under 5 years who were overweight also increased from less than 1% in 1988 to 5% in 2008. According to the Ghana Demographic and Health Survey of 2008, less than 5% of adults were also found to consume adequate amounts of fruits and vegetables. 41% of adults had not engaged in any vigorous physical activity 7 days before the survey, 9% of adult males use tobacco, and 20% of respondents reported heavy alcohol use in the 7 days preceding the survey (MOH, 2012)

These are the basis for the strategies employed by the National NCD control program to combat the NCD menace.

2.8 METABOLIC RISK FACTORS

2.8.1 Obesity

Obesity is no longer a condition of the affluent and adults. It is a major contributor to raised cholesterol, insulin resistance, and blood pressure. Research has shown that

increasing BMI has a direct relationship with type 2 diabetes, coronary artery disease, and ischemic heart disease. Waist circumference to height ratio (WHtR) has also been found to be a reliable measure of adiposity and increased risk of CVDs. There is also an increased likelihood of other comorbid conditions and death with increasing overweight. Central obesity is particularly linked with the occurrence of metabolic changes which lead to the biochemical changes underlying the NCD. Worldwide obesity is on the rise due to globalisation coupled with dietary changes towards energy-dense, fat-saturated, sugar-laden foods, and increasingly sedentary lifestyles. A study in Latin America found that even obesity affected both sexes; it was commoner in urban poor women (Nyberg et al., 2018) (Webber et al., 2012).

2.8.2 High blood pressure

The blood pressure reading is high defined by a systolic blood pressure of > 140mmHg and a diastolic of >90mmHg in the brachial artery of an erect person. The American Heart Association guideline considers a blood pressure of >130 – 139mmHg and a diastolic of 80-89mmHg as hypertension stage 1. It is one of the main signs of cardiovascular disease risk or diagnosis. About 70% of adults develop hypertension by 70 years (McMaster et al., 2015). The risk factors for high blood pressure include high salt intake, insulin resistance, obesity, genetics, endothelial dysfunction, restricted intrauterine nutrition, low birth weight, and the renin-angiotensin system. These factors interact to cause atherosclerosis or vascular alterations in the form of stiffening, increased wall-to-lumen ratio, and vasomotor tone leading to impeding the pliability of the vessels and thus increasing the pressure of blood flow through the vessels or from kidney or adrenal disease leading to raised hormones controlling the blood pressure.

Consequently, if unchecked, high blood pressures lead to heart failures, cerebrovascular accidents, and other end-organ diseases (Luft et al., 1999)(Muñoz-Durango et al., 2016). Regardless of the underlying cause, high blood pressure is managed with urgency to forestall further complications (Bataineh & Raij, 1998)(Schellings et al., 2006)

2.9 NON-METABOLIC RISK FACTORS

2.9.1 Physical Inactivity

Physical inactivity contributes to 3.3million deaths globally each year, making it the fourth leading underlying cause of mortality. In most countries, fewer than half of adults are active enough to harness the benefits of physical activity. Physical inactivity increases the risk of diseases such as T2DM, stroke, ischaemic heart disease, falls and hip fractures, and depression. It, therefore, exerts a high health burden on many economies. Physical inactivity has recently become part of mainstream public health and health policies. The gap between the size of the physical inactivity problem and the scale of public health response remains large (Parry et al., 2011) (MOH 2012)

2.9.2 Unhealthy Diet

An unhealthy diet is among the increasing risk factors of NCDs, contributing to the occurrence of metabolic syndrome which is a conglomerate of disorders such as abdominal obesity, hypertension, dyslipidemia, and glucose intolerance or insulin resistance. These in turn account significantly for the global burden of NCDs. The policy for Ghana is to have less than 7% of calories from saturated fatty acids and less than 1% from trans fatty acids. Daily cholesterol intake should be less than 300mg and

total fat intake not to exceed 20% to 35% of calories(Ip & Mokhlesi, 2007; Kent et al., 2015). Also, there's advocacy to include whole-grains, high-fiber, and at least five servings of fruits and vegetables a daily diet. Dietary salt consumption is recommended to reduce from the current 9g per day to 5g per day in 2025 by the WHO. Cutting down on dietary salt reduces the risk of cardiovascular disease remarkably. The government of Ghana has in its written policy to work with stakeholders such as food vendors, school management, parents, and consumers to effect changes gradually throughout 5 to 7 years (Mwenda et al., 2018).

2.9.3 Harmful Use of Alcohol

The excessive use of alcohol is associated with increased risk of most NCDs, especially cancers and liver cirrhosis. In 2007 the International Agency for Research on Cancer asserted that there was sufficient evidence that the level of alcohol use and the development of cancers is a dose-response relationship. Alcohol consumption is also associated with a high rate of road traffic accidents worldwide causing mortalities and morbidities(Ferner & Chambers, 2001). To remain at low risk of developing adverse effects of alcohol use, the recommendation is 14units per week for both sexes (Wilsnack et al., 2009)

The national policy for regulating alcohol consumption involves the establishment of a council to oversee the implementation of alcohol-related interventions, regulate the production, regulate distribution, marketing, and advertising as well as prevent and manage the health effects of harmful alcohol use (Parry et al., 2011) (MOH, 2012).

2.9.4 Tobacco Use

This is the single greatest preventable cause of NCDs worldwide. Tobacco use is responsible for 15,000 mortalities daily and accounts for 1 in 6 deaths globally from NCDs. The risk of acquiring cardiovascular disease is increased by two to four folds by tobacco use and it is an independent risk factor for T2DM. Smoking also causes chronic lung diseases that can be severely disabling or fatal, increasing the risk of death 12 times (Gbadamosi & Tlou, 2020).

2.10 Lifelong Implications of NCD

NCD are a significant source of preventable disability worldwide. The problems of NCD transcend physical disabilities, economic burden, and socio-cultural problems. These may set in at a younger age, or among the aging population of the elderly. In LMIC, the burden of NCD disabilities are rising, accounting for the disability-adjusted life years (DALY) of two out of every three years that is 75%. There is also an increasingly younger population of people living with complications of NCD (Richards et al., 2016).

This has been the basis for control and monitoring programs for NCD worldwide to evaluate the patterns and occurrences of disabilities from NCDs including the global NCD action plan (Boutayeb & Boutayeb, 2005).

The devastating complications of NCD may unfortunately be the first presentation for some patients and greatly affects the quality-adjusted life years (QALY). These disabilities have to be considered in policy development to promote the availability of long-term rehabilitative services (Al-Kaabi & Atherton, 2015).

Complications such as loss of productive time spent in health facilities for chronic respiratory conditions, visual impairment from T2DM and hypertension, Immobility

from strokes, loss of mental capacity from strokes, amputations as a result of peripheral vessel diseases, high cost of medical bills, and ultimately death. There is an attendant economic constraint on the patient's social support system and society as a whole. As a consequence of the complications, there is increased sedentary behaviour since the patient becomes incapable of engaging in activities of everyday life. The estimated cost of the major NCD on LMIC is 21 trillion American Dollars from 2008 to 2030 (Coates et al., 2020; Schopper et al., 2000).

CHAPTER THREE

METHODS

3.1 Study Design

This study was an analytical cross-sectional study conducted in the University Hospital, Legon, in the Greater Accra Region of Ghana.

3.2 Study Area

The University Hospital is the main health facility of the University of Ghana which renders care to the students, staff, and the general public in and around the University of Ghana. It is located behind the Legon Police Station about 12.6km from Aburi at latitude 5.651068, and longitude -0.177749 with a plus code of MR2C+CVAccra.

It was established in 1957 with the University which had a student population of 240 at the time.

It currently houses a 130-bed facility with subunits including the general wards, maternity, casualty and emergency, pediatric, general outpatient clinics, dental unit, diet therapy, and an operation theatre.

It serves as a district hospital for its catchment area in the Ayawaso constituency, receiving referrals from most primary health facilities in the area.

Figure 2: Map of the Legon area showing the site of the University Hospital from Google Maps in 2020.

3.3 Study Variables

The Dependent variable of the study is the physical activity levels of the staff of the University of Ghana. the physical activity levels will be assessed using the WHO Global Physical Activity Questionnaire (GPAQ) version 2. The level of physical activity will be measured using the cumulative activity levels of each of the 4 domains. This questionnaire consists of 19 items in 4 domains. It assesses PA at work, during travel from place to place, during recreational activities, and sedentary behaviour.

The activity at work domain consists of 6 items that measure the activity level and its duration related to one's work. The travel to and from the workplace domain is made up of 3 items that assess how much exertion is put into transportation on the part of the individual. The recreational activities domain assesses what intentional activities a person participates in to increase their PA levels. It contains 6 items. The sedentary behaviour domain contains 1 item and seeks to estimate time spent being inactive.

The independent variables include Body mass index (BMI), Systolic and Diastolic hypertension, Alcohol abuse, Tobacco use, Unhealthy dietary intake, and some sociodemographic factors will also be considered among the independent variables such as Age, Sex, Educational background, and Occupation.

Table 1: Summary of Variables Used in the study

Variable	Operational definition	Scale of measurement	Type
Dependent variable			
Physical Activity	Sum of domains	Categorical	Ordinal
Independent Variable			
Risk factors of NCD			
BMI	Weight (Kg)/ Height^2(m^2)	Categorical	Ordinal
WHtR	Waist circumference (cm)/Height(cm)	Categorical	Ordinal
Tobacco use	Non-smoker,	Binary	Nominal

	Current smoker		
Alcohol abuse	1 glass, 2glasses, 3 or more glasses	Categorical	Ordinal
Unhealthy Diet	Adding salt to prepared meals.	Binary	Nominal
NCD			
Type 2 Diabetes	Whether the participant has a diagnosis of T2DM or not	Binary	Nominal
High blood pressure	Whether a participant has a diagnosis of hypertension or not	Binary	Nominal
Asthma	Whether the participant has a diagnosis of asthma or not	Binary	Nominal
Cancer	Whether the participant has a diagnosis of cancer or not	Binary	Nominal
Socio-demographic Factors			
Age	Age at last birthday	Continuous	Ratio
Sex	Male, Female	Binary	Nominal
Educational Level	Primary, JHS, SHS, Tertiary	Categorical	Ordinal
Occupation	Occupation of participant	Categorical	Nominal
Religion	Christianity, Islam, Traditional	Categorical	Nominal
Marital Status	Never married, Married, Divorced/Widowed	Categorical	Nominal
Ethnicity	Akan, Ga, Ewe, Dagomba,	Categorical	Nominal
Household size	Number of dependents of respondent	Continuous	Ordinal
Place of residence	Where the respondent lives	Categorical	Nominal
Employment duration	How long respondent has been a permanent staff	Continuous	Ordinal

3.4 SAMPLING

3.4.1 Study Population

They included all cadres of permanent staff of the University of Ghana. The staff population is about 3000 staff members including the professional, and non-professional group. There is a male to female ratio of 2.4:1, with a sharper skewness among the professional staff group. The University has three basic ranks of staff members namely, senior members, senior staff, and junior staff members.

3.4.2 Sample Size Determination

The minimum sample size for the study was calculated using the Cochran (1977) formula for population proportions. A study by Afrifa-Anane et al., 2020 in Ghana reveals that the estimated proportion of staff with high physical activities was 0.16.

The sample size will be calculated as;

$$n = \frac{Z^2_{\frac{\alpha}{2}} \times p \times (1-p)}{e^2}$$

Where n= the minimum sample size

α = significance level = 0.05

Z = z-score for population distribution at 95% confidence interval =1.96

e = margin of error or precision = 5%

p = proportion of high physical activity (estimated proportion) = 0.16. Hence, p will be assumed to 0.16.

The minimum sample size computation using Cochran (1977) is given as;

$$n = \frac{1.96^2 \times 0.16 \times (1 - 0.16)}{0.05^2} = 206$$

Accounting for 10 % non-response rate, the total number of participants was calculated as follows: 206 + (0.10 × 206) = 232. Therefore, the required final sample size of 232 staff was selected for the study.

3.4.3 Sampling Method

The participants for the study were selected by simple random sampling of permanent staff members of the University of Ghana who were visiting the University Hospital, Legon. The identification of staff members was done from the hospital's Health Information System (HIS) by the research assistants and the principal investigator (PI). The order of arrival at the hospital was used as a numbering system on the HIS. Twenty (20) participants were randomly selected in a day by balloting their ordering numbers. This was continued till at most 20 willing participants were sampled per day. Participants were allowed to enroll once in the study. The recruitment of participants continued till the required sample size of 232 was obtained.

3.5 Pretesting

The questionnaire was pretested at the Student's Clinic wing of the University Hospital using 5 participants. The Student's clinic has a population with similar socio-demographic characteristics of staff required for the study. After pretesting, the questionnaire was modified based on feedback received. The participants used in the pretesting were excluded from the main study.

3.6 Data Collection Technique and Tools

All Coronavirus 2019 (Covid-19) protocols were observed in the administration of questionnaires and interactions with the study participants. The principal investigator and research assistants were gowned in personal protective equipment including an overall gown, facemasks, and gloves for the entire period of the study. Caution was taken to sanitize hands after attending to each person and wash hands after every five participants.

The GPAQ was administered to the participants to assess their level of physical activity. The GPAQ was developed as part of the WHO STEPwise Approach to Chronic Disease Risk Factor Surveillance for PA observation. It replaced the International Physical Activity Questionnaire (IPAQ). GPAQ version 2 is more suited for developing countries because it considers the cultural differences in activities that contribute to physical activity. The GPAQ was designed to inform regional variations in PA over a period and also to advise PA policies (Guthold et al., 2011).

PA is measured in metabolic equivalents (MET), which is defined as the energy expended while sitting being 1 MET. The questionnaire classifies PA into light, moderate, and vigorous. A range of activities is considered in the questionnaire including PA related to house chores, employment, transportation, and leisure activities. Light PA is in the range of 1.6-2.9 MET, while moderate PA ranges between 3.0 – 6.0 MET, and vigorous-intensity activity are above 6 MET. Light PA includes slow walking, and house chores, moderate-intensity PA includes cycling, and dancing, while vigorous-intensity includes football, and jogging (Cleland et al., 2014).

Anthropometric measurements including weight, height, waist circumference, and blood pressure were taken for those recruited. Lipid profile and blood glucose were not measured in this study due to time constraints and the resources available for the study.

Weight was measured using a calibrated electronic scale with participants emptying their clothing and being unshod. The weight balance was zeroed before each participant was weighed. Height was measured to the nearest 0.1cm using a wall-mounted stadiometer, and waist circumference was measured using a tape measure. The waist circumference was taken around the abdomen, with the participant standing. The tape measure was placed horizontally around the waist, just before the hip, and kept taut without compressing the skin at the point of exhalation of the participant. The systolic and diastolic blood pressure of participants was measured using a well-calibrated electronic sphygmomanometer after allowing the participant to sit and rest. An appropriate blood pressure cuff size for the participant which covers more than 40% of the upper arm circumference was used. Measurements were taken with the participants' arm resting on a surface at the level of the heart. Blood pressure readings were taken twice at 5-minutes intervals and the average recorded. BMI was computed as weight in kilograms divided by height in meters squared (kg/m^2). Information on age, dietary choices, alcohol consumption, and tobacco use were acquired through a structured self-administered questionnaire.

3.7 Data Processing and Analysis

For the analysis of GPAQ data, existing guidelines have been adopted. It is estimated that, compared to sitting quietly, a person's caloric consumption is four times as high when being moderately active, and eight times as high when being vigorously active. Therefore, when calculating a person's overall energy expenditure using GPAQ data, 4 METs get assigned to the time spent in moderate activities, and 8 METs to the time spent in vigorous activities (WHO, 2012).

3.7.1 Assessing the level of physical activities among study participants

Physical activity (or inactivity) was described in two ways; by treating the total MET-minutes per week for each respondent as a continuous variable, and also by classifying a certain percentage of a population as 'inactive' or 'insufficiently active' by setting up a cut-point for a specific amount of physical activity.

As per WHO Recommendations, adults should do at least a combination of moderate- and vigorous-intensity physical activity achieving at least 600 MET-minutes throughout a week, including activity for work, during transport, and leisure time. Adult's physical activity that met WHO recommendation of at least 600 MET-minutes was again categorized into "Vigorous" (achieving a minimum of at least 3000 MET-minutes per week), "Moderate" (a person not meeting the criteria for the vigorous category, but achieved a minimum of at least 1500 MET-minutes per week from any combination of walking, moderate-or vigorous-intensity activities) and "light" (a person not meeting the criteria for the moderate category but achieved the WHO recommended value of at least 600 MET-minutes per week. (Mengesha, et al., 2019).

The bar-chart was used to describe the level of participation in various levels of activities and the overall level of weekly physical activities (outcome variable) in the study. Due to high skewness and non-normality in the MET-times, minimum, 25th percentile, median, 75th percentile, and the maximum MET time for various vigorous and moderate activities were determined.

3.7.2 Examing the socio-demographic characteristics associated with physical activities among study participants

The various level of physical activities were described across the various socio-demographic characteristics using frequencies and percentages. The mean age and

standard deviation of the study participants was also described across the four physical activities levels. The bar-chart was also used to described the four levels of physical activities by sex and also occupation.

For inferential statistical analysis, the one-way ANOVA test was used to assess the equality of mean age, mean BMI score, mean systolic blood pressure, mean diastolic blood pressure and mean waist-for-height ratio across the four levels of physical activities. For categorical variables, Pearson's chi-square test was used to assess the association between categorical socio-demographic factors and the level of physical activities among the study participants. All test from both the one-way ANOVA and the Pearson's chi-square test were considered statistically significant for p-values less than 0.05.

3.7.3 Examing the association between risk factors of NCD and other factors on physical activity level.

The various level of physical activities were described across the various risk factors of NCDs using frequencies and percentages. The mean and standard deviation of continuous variables such as BMI score, systolic blood pressure, diastolic blood pressure, and waist-for-height ratio were were also described across the four physical activities levels. For inferential statistical analysis, the one-way ANOVA test was used to assess the equality of mean BMI score, mean systolic blood pressure, mean diastolic blood pressure and mean waist-for-height ratio across the four levels of physical activities. For categorical variables, Pearson's chi-square test was used to assess the association between categorical rsik factors of NCDs and the level of physical activities among the study participants. All test from both the one-way ANOVA and the

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.7.4 Regression model of factors associated with the level of physical activities among study participants

The outcome variable level of physical activities had three levels, no physical activitiy coded 1), low physical activity (coded 2), moderate physical activity (coded 3) and igh level of physical activity (coded 4). Due to the ordinal nature of the outcome ariable, the ordered logistic regression model was necessary for assessing the factors ssociated with physical activities level. However, the proportional of odds assumption vas violated with a significant tests using the omodel likelihood-ratio test in stata (χ^2=57.59, df=30, p=0.002).

Due to the violation of the proportionality of odds assumption, the generalized logistic egression model was used to assess the odds of higher levels of weekly physical ctivities among the study participants. The user written command *"gologit2"* in STATA was used. As a result odds were estimated for the following pairwise pairing: 1) High, moderate, and low physical activity against no physical activity, (2) High or noderate level of physical activity against low or no physical activity, and (3) High evel of physical activity against moderate, low or no physical activity.

95% confidence interval of all odds ratios were estimated accordingly and all statistical analysis was considered significant at p-values below 0.050. STATA IC version 15 was used to analyze the data.

3.8 Inclusion Criteria

The inclusion criteria entailed all consenting permanent staff of the University of Ghana who visited the University Hospital, Legon regardless of their years of service. Temporary staff were not included in the study.

3.9 Exclusion Criteria

Exclusion criteria involved all staff who met the inclusion criteria but were critically ill and not in the best frame of mind at the time of the study. Pregnant members of staff were also excluded from the study.

3.10 Ethical Considerations

Ethical clearance was sought from the Noguchi Memorial Institute for Medical Research Ethical Review Committee with approval number NMIMR-IRB CPN 059/19-20. Permission was also sought from the Administration of the University Hospital for the study. An informed consent form was made available to the participants inviting them to volunteer for the study. The consent form clearly stated a description of the project and the procedures involved, possible risks, inconveniences, and benefits of the study to the participants. Issues of confidentiality of the information given, voluntary participation, and the right to drop out of the study were considered. The researcher also made contacts available on the consent form to be reached for additional information or further clarification needed by the participants.

3.11 Safety Considerations

Confidentially and anonymity of the participants were strictly maintained. Filled forms were stored under lock and key and only made accessible to the research staff and the Ethical Review Committee.

CHAPTER FOUR

RESULTS

The research was conducted between July to September 2020, with 205 valid responses after data collection.

4.1 Level of physical activity of study participants

Based on the responses, the distribution of mode of physical activity engagement was collated. Most of the respondents (96 (46.8%)) were involved in PA related to transportation or moving from one place to another and a substantive number (43(21.0%)) involved in moderate PA related to work.

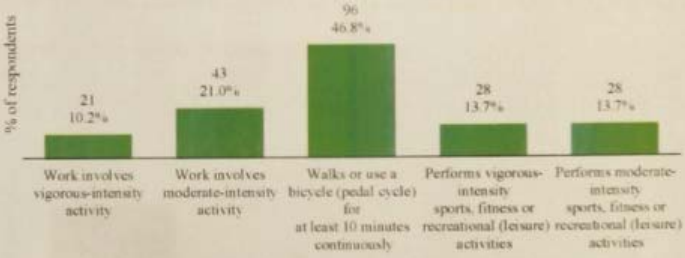

Figure 3: Participation in various level of physical activity among study participants

The data indicate that at least 75% of respondents were not involved in vigorous work, moderate work, moderate recreation, nor vigorous recreation. There were however 96 of the study participants were engaged in PA related to transportation.

4.2 Socio-demographic characteristics of Respondents

The collated data shows that the mean age of respondents was 40.9 ± 7.3 years with more male respondents comprising 114 (55.6%) than females. The majority of the respondents 149 (72.6%) were married as well as 158 (77.1%) of the participants being professionals. Professionals were defined as any skilled occupations such as administrative and teaching staff. Further characteristics signifying socio-economic status included in the study were educational level, department of work, and household size. The majority of the respondents had tertiary level of education as their highest attained education, most of them were non-teaching staff with 4-6 dependents in their household. (Table 3)

Table 3: The Socio-Demographic Characteristics

Characteristics	Frequency	Percentage
Mean Age(±SD)	40.8±7.8	
Median Age(±SD)	40	
Age Groups		
21-30	18	8.8
31-40	89	43.4
41-50	72	35.1
50+	26	12.7
Sex		
Male	114	55.6
Female	91	44.4
Marital Status		
Never Married	44	21.5
Married/Living Together	149	72.6
Divorced/Separated/Widowed	12	5.9
Education Level		
Primary	4	2.0
Middle/JSS/JHS	5	2.4
Secondary and above	38	18.5
Tertiary	158	77.1
Religion		
Christianity	178	86.8
Islam	26	12.7
Traditional	1	0.5
Ethnicity		
Akan	75	36.5
Ga	44	21.5
Ewe	44	21.5
Hausa	4	2
Other	38	18.5
Occupation		
Non-Professional	47	22.9
Professional	158	77.1

Department of Work		
Administration	12	5.9
Faculty/Academic/Teaching	56	27.3
Other Services/Non-Teaching	137	66.8
Employment Duration		
1-5	63	30.7
6-10	82	40
11-15	36	17.5
16-20	12	5.9
21-25	12	5.9
Characteristics	**Frequency(n)**	**Percentage (%)**
Place of residence		
Around the school(<3km)	59	28.8
Away from the school(>3km)	146	71.2
Household size		
1-3	80	39
4-6	116	56.6
>6	9	4.4

4.3 Socio-demographic Characteristics associated with Physical Activity

Participants' mean age for the categories of PA levels was declining with increasing PA with the mean age for low PA being 42.0 ± 8.3 and for high-intensity activity 38.1±8.7. There was a significant difference in the age of the participates compared to the PA output P-value 0.041. The level of education also showed statistical differences in the intensity of PA exhibited by the participants, P<0.001, likewise the occupation of the participant. The department of work of the participants was also significant of note in terms of the PA portrayed by the respondents, P-value = 0.011. There was a significant difference in the physical activity domains of the professional and non-professional group concerning energy expended at work, and during transportation; P<0/001 respectively.

Table 4: Socio-demographic characteristics associated with the level of physical activities among study participants

Variables	Level of Physical activities				P-value
	No activity	Low MET	Average MET	High MET	
	n (%)	n (%)	n (%)	n (%)	
N	121	48	18	18	
Age, (Mean ± SD)	40.9 ± 7.3	42.0 ± 8.3	39.8 ± 8.4	38.1 ± 8.7	0.300 *
Age group					0.240
26-29	5 (4.1)	3 (6.3)	2 (11.1)	3 (16.7)	
30-39	52 (43.0)	17 (35.4)	9 (50.0)	9 (50.0)	
40-49	49 (40.5)	18 (37.5)	3 (16.7)	4 (22.2)	
50-59	15 (12.4)	10 (20.8)	4 (22.2)	2 (11.1)	
Sex					0.041
Male	58 (47.9)	31 (64.6)	14 (77.8)	11 (61.1)	
Female	63 (52.1)	17 (35.4)	4 (22.2)	7 (38.9)	
Marital status					0.350
Never married	25 (20.7)	7 (14.6)	7 (38.9)	5 (27.8)	
Married/living together	87 (71.9)	39 (81.3)	11 (61.1)	12 (66.7)	
Divorced/separated/widowed	9 (7.4)	2 (4.2)	0 (0.0)	1 (5.6)	
Highest level of education					<0.001
Primary/JHS/Middle	2 (1.7)	3 (6.3)	0 (0.0)	5 (27.8)	
Secondary	16 (13.2)	8 (16.7)	9 (50.0)	5 (27.8)	
Tertiary	103 (85.1)	37 (77.1)	9 (50.0)	8 (44.4)	
Work department					0.011
Administration	10 (8.3)	1 (2.1)	1 (5.6)	0 (0.0)	
Faculty/academic/teaching	40 (33.1)	14 (29.2)	2 (11.1)	0 (0.0)	
Other services/non-teaching	71 (58.7)	33 (68.8)	15 (83.3)	18 (100.0)	
Occupation					<0.001
Non-professional	17 (14.0)	11 (22.9)	9 (50.0)	10 (55.6)	

Professional	104 (86.0)	37 (77.1)	9 (50.0)	8 (44.4)	
Place of residence					0.380
Around the school	37 (30.6)	15 (31.3)	2 (11.1)	5 (27.8)	
Away from the school	84 (69.4)	33 (68.8)	16 (88.9)	13 (72.2)	
Employment duration					0.630
1-5	36 (29.8)	14 (29.2)	6 (33.3)	7 (38.9)	
6-10	46 (38.0)	20 (41.7)	10 (55.6)	6 (33.3)	
>10	39 (32.2)	14 (29.2)	2 (11.1)	5 (27.8)	
Religion					0.190
Christian	109 (90.1)	38 (79.2)	14 (77.8)	16 (88.9)	
Non-Christians	12 (9.9)	10 (20.8)	4 (22.2)	2 (11.1)	
Ethnicity					0.890
Akan	43 (35.5)	16 (33.3)	7 (38.9)	9 (50.0)	
Ga	27 (22.3)	10 (20.8)	4 (22.2)	3 (16.7)	
Ewe	26 (21.5)	10 (20.8)	3 (16.7)	5 (27.8)	
Others	25 (20.7)	12 (25.0)	4 (22.2)	1 (5.6)	
Household size					0.340
1-3	42 (34.7)	20 (41.7)	8 (44.4)	10 (55.6)	
>3	79 (65.3)	28 (58.3)	10 (55.6)	8 (44.4)	
Type of chronic illness					0.700
No chronic illness	74 (61.7)	26 (55.3)	9 (50.0)	14 (77.8)	
Asthma	8 (6.7)	3 (6.4)	1 (5.6)	0 (0.0)	
Diabetes	8 (6.7)	6 (12.8)	1 (5.6)	1 (5.6)	
Hypertension	30 (25.0)	12 (25.5)	7 (38.9)	3 (16.7)	

#: P-values are from the One-Way ANOVA test. All other P-values are from the Pearson's chi-square test

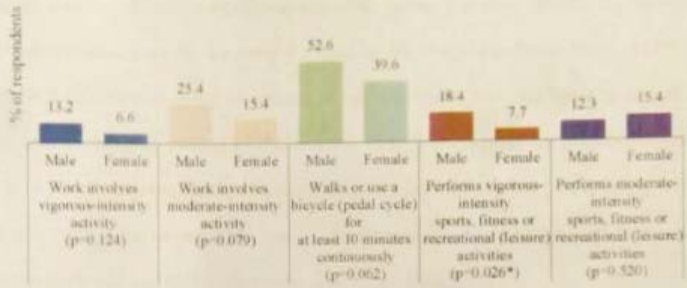

Figure 5:Association between sex and participation in various levels of physical activity

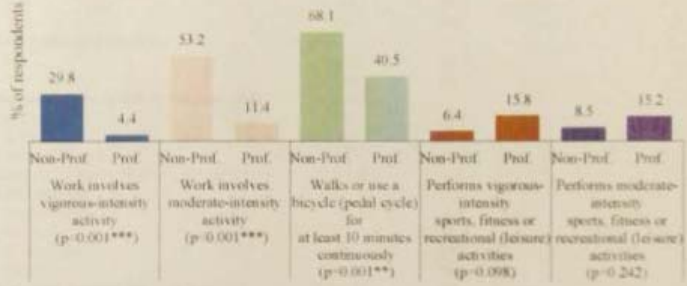

Figure 6: Association between occupation and participation in various levels of physical activity

4.4 Distribution of risk factors of NCD among respondents

The risk factors include metabolic and non-metabolic factors. They contribute to one's likelihood of developing NCD. Among the study participants, 9.8% were current users of tobacco. Alcohol use was prevalent at 60.5% of the participants. The mean BMI was

27.2±5.1, with the majority of respondents being overweight, similar to the waist to height ratio with 35.6% being the majority of the group. The mean systolic and diastolic blood pressures were in the normal range for the study population being 125.7 (± 13.9)/77.6 (± 10.4). A lower proportion of the participants had high blood pressures at the time of the study making 15.6%. in terms of high caloric diet and addition of extra salt to already prepared meals, the participants reported 64.4% and 80.5% eating more than 3 meals a day on weekdays and weekends respectively, 66.8% never added extra salt to the meals, and 48.7% sometimes took in fast food.

Table 5: Risk factors of Non-communicable diseases among study participants

Risk factors of NCD	Frequency	Percentage
N	205	
Ever smoked tobacco		
No	185	90.2
Yes	20	9.8
Ever consumed alcohol		
No	81	39.5
Yes	124	60.5
Number of breakfasts in the past week		
4-5 Times	122	59.5
6 Times	49	23.9
Never Skipped	34	16.6
Body Mass Index (Kg/m^2), (Mean ± SD)	27.2 ± 5.1	5.1
BMI category		
Underweight	7	3.4
Normal	63	30.7
Overweight	81	39.5
Obese	54	26.3
Waist-for-height ratio, (Mean ± SD)	0.6 ± 0.1	0.1
Waist-for-height ratio		
Slim (<0.5)	61	29.8
Healthy (0.5/0.59)	71	34.6
Overweight (>=0.6)	73	35.6
Systolic blood pressure, (Mean ± SD)	125.7 ± 13.9	13.9
Diastolic blood pressure, (Mean ± SD)	77.6 ± 10.4	10.4
Blood pressure level		
Normal	173	84.4
High	32	15.6
Number of meals during weekdays		
Twice	73	35.6
Three or more	132	64.4
Number of meals during weekends		
Twice	40	19.5
Three or more	165	80.5
Uptake of extra salt during meals		
Never	137	66.8
Rarely	54	26.3

Sometimes	14	6.8
Usual time for lunch		
12:00pm-12:59pm	29	14.4
1:00pm-1:59pm	97	48
2:00pm-2:59pm	65	32.2
Later time/Skip Lunch	11	5.4
Usual time for supper		
5:00pm-5:59pm	12	5.9
6:00pm-6:59pm	72	35.6
7:00pm-7:59pm	101	50
Later Time/Skip Lunch	17	8.4
Frequency of fast-food uptake		
Never/rarely	106	51.7
Sometimes/Always	99	48.3

4.5 Distribution of Physical activity levels and risk factors of NCD

The risk factors of NCD assessed in the study included tobacco use, unhealthy diet, measures of adiposity (that is BMI, and WHtR). There was a significant difference between the WHtR of respondents and the physical activity intensity they engaged in, (P=0.019). the number of meals consumed by the participants on weekdays and weekends also had a significant correlation with the level of physical activity, (P=0.010, and 0.005) respectively. The usual lunchtime of the respondents also showed a significant association with their levels of physical activity (p=0.044).

Table 6: Association between risk factors of NCDs and level of physical activity

Variables	Level of physical activities				P-value
	No activity	Low	Average	High	
	n (%)	n (%)	n (%)	n (%)	
N	121	48	18	18	
Ever smoked tobacco					0.720
No	111 (91.7)	43 (89.6)	15 (83.3)	16 (88.9)	
Yes	10 (8.3)	5 (10.4)	3 (16.7)	2 (11.1)	
Ever consumed alcohol					0.055
No	57 (47.1)	14 (29.2)	6 (33.3)	4 (22.2)	
Yes	64 (52.9)	34 (70.8)	12 (66.7)	14 (77.8)	
Number of breakfasts in the past week					0.490
4-5 Times	30 (24.8)	9 (18.8)	4 (22.2)	6 (33.3)	
6 Times	16 (13.2)	9 (18.8)	4 (22.2)	5 (27.8)	
Never Skipped	75 (62.0)	30 (62.5)	10 (55.6)	7 (38.9)	
Body Mass Index (Kg/m^2), (Mean ± SD)	26.7 ± 5.4	27.8 ± 4.1	27.5 ± 5.0	28.6 ± 5.4	0.380 *
BMI category					0.410
Under weight	5 (4.1)	0 (0.0)	2 (11.1)	0 (0.0)	
Normal	40 (33.1)	14 (29.2)	3 (16.7)	6 (33.3)	
Over weight	47 (38.8)	21 (43.8)	8 (44.4)	5 (27.8)	
Obese	29 (24.0)	13 (27.1)	5 (27.8)	7 (38.9)	
Waist-for-height ratio, (Mean ± SD)	0.6 ± 0.1	0.6 ± 0.1	0.5 ± 0.1	0.5 ± 0.1	0.009 *
Waist-for-height ratio					0.019

Slim (<0.5)	40 (33.1)	6 (12.5)	8 (44.4)	7 (38.9)	
Healthy (0.5/0.59)	37 (30.6)	19 (39.6)	6 (33.3)	9 (50.0)	
Overweight (>=0.6)	44 (36.4)	23 (47.9)	4 (22.2)	2 (11.1)	
Systolic blood pressure, (Mean ± SD)	125.7 ± 12.2	127.1 ± 15.2	126.2 ± 14.4	121.6 ±19.8	0.560 #
Diastolic blood pressure, (Mean ± SD)	78.2 ± 9.6)	77.4 ± 11.8	77.6 ± 9.8	74.6 ±12.2	0.590 #
Blood pressure level					0.120
Normal	107 (88.4)	37 (77.1)	16 (88.9)	13 (72.2)	
High	14 (11.6)	11 (22.9)	2 (11.1)	5 (27.8)	
Number of meals during weekdays					0.010
Twice	34 (28.1)	20 (41.7)	12 (66.7)	7 (38.9)	
Three or more	87 (71.9)	28 (58.3)	6 (33.3)	11 (61.1)	
Number of meals during weekends					0.005
Twice	14 (11.6)	14 (29.2)	7 (38.9)	5 (27.8)	
Three or more	107 (88.4)	34 (70.8)	11 (61.1)	13 (72.2)	
Uptake of extra salt during meals					0.290
Never	84 (69.4)	33 (68.8)	10 (55.6)	10 (55.6)	
Rarely	32 (26.4)	12 (25.0)	5 (27.8)	5 (27.8)	
Sometimes	5 (4.1)	3 (6.3)	3 (16.7)	3 (16.7)	
Usual time for lunch					0.044
12:00pm-12:59pm	13 (11.0)	8 (16.7)	4 (22.2)	4 (22.2)	
1:00pm-1:59pm	63 (53.4)	22 (45.8)	8 (44.4)	4 (22.2)	
2:00pm-2:59pm	39 (33.1)	15 (31.3)	5 (27.8)	6 (33.3)	
Later time/Skip Lunch	3 (2.5)	3 (6.3)	1 (5.6)	4 (22.2)	
Usual time for supper					0.380
5:00pm-5:59pm	5 (4.2)	4 (8.3)	1 (5.6)	2 (11.1)	
6:00pm-6:59pm	41 (34.7)	17 (35.4)	5 (27.8)	9 (50.0)	
7:00pm-7:59pm	59 (50.0)	25 (52.1)	12 (66.7)	5 (27.8)	
Later Time/Skip Lunch	13 (11.0)	2 (4.2)	0 (0.0)	2 (11.1)	
Frequency of fast-food uptake					0.640
Never/rarely	62 (51.2)	27 (56.3)	10 (55.6)	7 (38.9)	
Sometimes/Always	59 (48.8)	21 (43.8)	8 (44.4)	11 (61.1)	

#: P-values are from the One-Way ANOVA test. All other P-values are from the Pearson's chi-square test

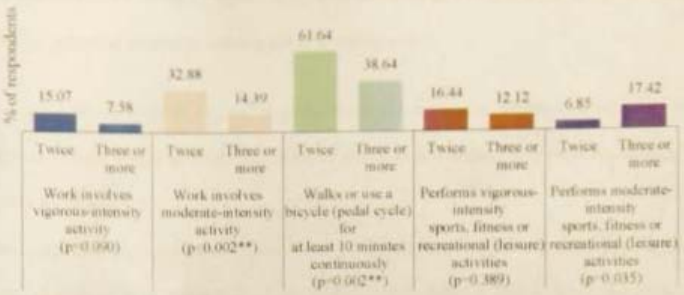

Figure 7: Association between the number of daily meals on weekdays and participation in various levels of activities

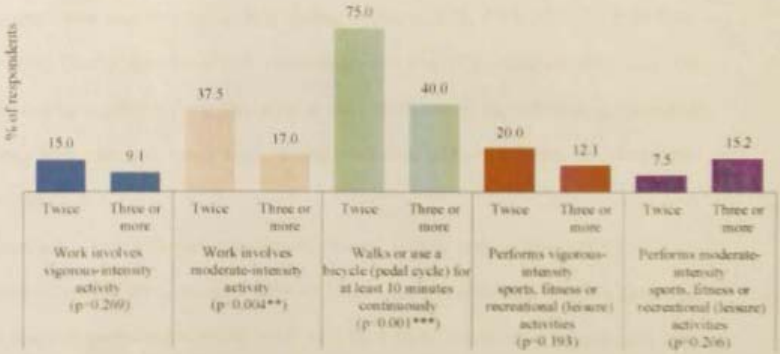

Figure 8: Association between number of daily meals on weekends and participation in various levels of activities

4.6 Generalized Ordered Logistic Regression Model of Factors associated with the level of physical activities among study Participants

The generalized ordered logistic regression model was used which can estimate the odds at various stages of increasing level of physical activities. The results are shown in Table 4.4 below.

The odds of high, moderate, or low level of physical activities was 54% less among females compared to males (OR: 0.46, 95% CI: 0.26-0.82, p<0.01). Also, the odds of high moderate, or low level of physical activities were 71% less among professional workers compared to non-professional workers (OR: 0.29, 95% CI: 0.15-0.58, p<0.001). The odds of high, moderate, or low level of physical activities was 55% less among respondents who take three or more meals daily during the weekdays compared to those who take two meals daily during weekdays (OR: 0.45, 95% CI: 0.25-0.81, p<0.01). Finally, the odds of high, moderate, or low level of physical activities was 71% less among respondents who take three or more meals during the weekdays compared to those who take two meals daily during weekdays (OR: 0.29, 95% CI: 0.14-0.60, p<0.01).

Comparing those with high or moderate physical activity level to those with low or no physical activity level, the odds were 82% less among professional workers compared to non-professional workers (OR: 0.18, 95% CI: 0.08-0.38, p<0.001), the odds was 73% less among those overweight from the waist-to-height ratio measurement compared to those who were slim (OR: 0.27, 95% CI: 0.10-0.76, p<0.05). Also, the odds of high or moderate level of physical activities was 58% less among those who have three or more daily meals during weekdays (OR: 0.42, 95% CI: 0.20-0.87, p<0.05) and 60% less for those who have three or more daily meals during weekends (OR: 0.40, 95% CI: 0.18-0.89, p<0.05).

High level of physical activity was 80% less among professional workers compared to non-professional workers (OR: 0.20, 95% CIL 0.07-0.53, p<0.001). (Table 4.4).

Table 7: Generalized ordered logistic regression model of factors associated with the level of physical activities among study participants

	Generalized ordered logistic regression model		
	(High, Moderate & Low) vs. (No activity)	(High & Moderate) vs. (Low & No activity)	(High) vs. (Low, Moderate & No activity)
Variables	OR [95% CI]	OR [95% CI]	OR [95% CI]
Age group			
26-29	1.00 [reference]	1.00 [reference]	1.00 [reference]
30-39	0.52 [0.19-1.44]	0.75 [0.24-2.37]	0.63 [0.16-2.58]
40-49	0.45 [0.16-1.29]	0.28 [0.08-1.02]	0.29 [0.06-1.45]
50-59	0.80 [0.24-2.67]	0.47 [0.11-2.08]	0.20 [0.02-2.10]
Sex			
Male	1.00 [reference]	1.00 [reference]	1.00 [reference]
Female	0.46 [0.26-0.82] **	0.49 [0.23-1.06]	0.78 [0.29-2.10]
Highest level of education			
Primary/JHS/Middle	1.00 [reference]	1.00 [reference]	(empty)
Secondary	0.92 [0.14-6.14]	(empty)	(empty)
Tertiary	0.35 [0.06-2.16]	(empty)	(empty)
Occupation			
Non-professional	1.00 [reference]	1.00 [reference]	1.00 [reference]
Professional	0.29 [0.15-0.58] ***	0.18 [0.08-0.38] ***	0.20 [0.07-0.53] **
Work department			
Administration	1.00 [reference]	1.00 [reference]	(empty)
Faculty/academic /teaching	2.00 [0.39-10.15]	0.41 [0.03-4.89]	(empty)
Other services/non-teaching	4.65 [0.98-22.00]	3.49 [0.43-28.05]	(empty)
Waist-for-height ratio			
Slim (<0.5)	1.00 [reference]	1.00 [reference]	1.00 [reference]
Healthy (0.5/0.59)	1.75 [0.87-3.54]	0.82 [0.36-1.86]	1.12 [0.39-3.21]
Overweight (>=0.6)	1.26 [0.62-2.54]	0.27 [0.10-0.76] *	0.22 [0.04-1.09]
Number of meals during weekdays			

Twice	1.00 [reference]	1.00 [reference]	1.00 [reference]
Three or more	0.45 [0.25-0.81] **	0.42 [0.20-0.87] *	0.86 [0.32-2.32]
Number of meals during weekends			
Twice	1.00 [reference]	1.00 [reference]	1.00 [reference]
Three or more	0.29 [0.14-0.60] **	0.40 [0.18-0.89] *	0.60 [0.20-1.79]
Usual time for lunch			
12:00pm-12:59pm	1.00 [reference]	1.00 [reference]	1.00 [reference]
1:00pm-1:59pm	0.44 [0.19-1.02]	0.37 [0.13-1.02]	0.27 [0.06-1.15]
2:00pm-2:59pm	0.54 [0.22-1.31]	0.53 [0.19-1.51]	0.64 [0.16-2.45]
Later time/Skip Lunch	2.17 [0.48-9.86]	2.19 [0.52-9.23]	3.57 [0.71-18.04]

OR: odds ratio. CI: confidence interval.
P-value notation: *: p<0.05. **: p<0.01. ***: p<0.001
(empty): Estimate were missing due to low frequency in those cells

CHAPTER FIVE

DISCUSSION

5.1 Patterns of Various Levels of physical activity among Respondents

The distribution of energy expenditure per week by study participants revealed that most people were physically active by virtue of their need for transportation. The respondents showed the highest levels of physical activity during the domain for PA involved in moving from place to place. This is in tandem with studies that have shown that by choosing public transport, people can increase their PA levels significantly per week. PA expended in moving from place to place can enable the attainment of a cumulative amount of at least 30minutes a day in walking which meets the recommended 150minutes a week of moderate-intensity PA for health by WHO (Juneau & Potvin, 2010).

Some policies for obesity reduction proposed increased patronage of public transport to increase the likelihood of people engaging in needful PA rather than planned PA sessions which were likely to be inconsistent and low in intensity (Chaix et al., 2014). Findings from a study by Rissel et al., 2012 indicated that, if 20% of inactive adults would increase their participation in walking by 16 minutes per day for 5 days a week, there may be an estimated 6.97% increase in adult populations considered sufficiently active.

Participants in this study showed decreasing levels of physical activity participation in leisure activities as well as the intensities of energy expended in leisure activities. An equal proportion of respondents were also involved in leisure PA with equal levels of intensity. Between moderate-intensity and vigorous-intensity activities, 13.7% of

participants were engaged equally. Considering the demands of the urban setting of living, there is an increased demand on the time and resources of urban dwellers and people need high levels of determination to be able to consistently engage in leisure PA. Leisure physical activity advocacy alone is not recommended as an effective public health approach to increasing PA of populations and especially for obesity control as the baseline energy expenditure recommendations may be useful for cardiovascular disease prevention but not for obesity control (Milton et al., 2014). Studies in Canada by (Csizmadi et al., 2011) indicated that people had more control over their leisure PA levels and these decreased with increasing intensity of PA levels.

Work-related PA showed higher proportions than leisure activities. Where work is designed to engage a person actively in PA, they are more likely to meet weekly work recommendations. Studies have shown that the health hazards of being sedentary cannot be nullified by engaging in PA after a period of inactivity. Thus, people in jobs that require movement, and lifting benefit in the long run.

From the summary of the MET per minute expended by participants, it indicated that, based on the quartiles, except for PA expended during transportation, at least 75% of the respondents did not participate in the various PA intensity levels either at work or during leisure time. This reiterates the need for incorporating PA into the daily routines of people since there is a high chance of them not actively taking up PA voluntarily. Advocating for accumulated shorter bouts of activities may be more adaptable and feasible to the long-term compliance and improved health outcomes. This may be more conducive as the activity may be worked into the usual routine such as walking at lunchtime for at least 10minutes to get a meal (Barr-Anderson et al., 2011).

5.2 Levels of Physical activity among study Participants

By the WHO recommendations, a MET minute per week of 600MET is the cut-off measure of a physically active person. Based on this computation, the majority of the respondents 121(59.0%) were found to be physically inactive as they did not meet the recommended 600MET minutes per week. The demands of urban life with improved technological advancements which make life easier have a role to play. Respondents were increasingly less active with the least involvement in PA being the moderate-intensity and vigorous-intensity activities. These are interestingly the levels of activity needed to improve cardiovascular health and prevent diseases including NCD. There is a dose-dependent relationship between PA and health outcomes thus, the more the better. The health benefits go beyond just weight management but also improved mental health which will eventually improve general well-being as the saying goes, "a sound mind lives in a sound body", as well as improve productivity.

These were much higher than national figures where, 29.0% of urban Ghanaians were found to be physically inactive (Afrifa–Anane et al., 2015), and in the GDHS 2008, it was found that 41% of Ghanaian adults had not participated in any vigorous-intensity activity in the last 7days before the survey (Ministry of Health, 2012). A study by Y. J. Yang, 2019 showed that between 2014 to 2017, physical activity levels decreased among adults in Korea from 50% to 48.5%. Thus, worldwide trends are showing that physical activity levels are deteriorating which is also shown by the higher percentage of physically inactive respondents in this study as compared to the GDHS 2008 findings.

Out of the 84 participants who met the WHO criteria for physically active, the majority of them exhibited light physical activity, 48 (23.4%) of 84. These activities include slow walking to and from places, and activities during light house chores such as watering

the garden. These activities are beneficial as the American Heart Foundation puts it, "any activity is better than none". At this level of activity, the harnessed benefits are lower as the relationship between physical activity and health outcomes is a dose-dependent relationship. According to a study by Bassett et al., 2015, the use of public transport imposes about 8-33minutes of additional walking which will increase the proportion of physically active people by about 6.9%.

Both moderate and vigorous-intensity physical activity were exhibited by the same number of participants 18 (8.8%). These could be met by climbing stairs, cycling, and jogging.

5.3 Socio-demographic characteristics of Respondents

Findings from the National Policy for Prevention and Control of NCD stated that 14% of adults in the survey used tobacco, while the prevalence from this study was 9.78%.

Those with high systolic or diastolic blood pressure were found to be 15.6% of the participants. These included those who were not known to have hypertension as those with controlled hypertension may have normal blood pressure readings. The problem of undiagnosed hypertension is an issue of public health concern. A meta-analysis by Ataklte et al., 2015 indicated that up to 56% of people with high blood pressure are unaware of the problem and this can be catastrophic.

About overweight and obesity, 81(39.5%) were found to be in the overweight category, and 54 (26.4%) obese. These are consistent with other studies in the Ghanaian population which found overweight to be 25.4% overweight, and 17.1% obese (Ofori-Asenso et al., 2016)

Alcohol was quantified by a glass measuring 125ml and equivalent to 1.25U of beer and 3U for spirits. Based on the study, the majority of the respondents who consumed alcohol used 3 glasses at a sitting, followed by 2 glasses with 33.7% and 24.4% respectively. Most of the alcohol users had a drink of alcohol up to 3 times a week. This is consistent with findings from a study by Welbeck J, 2015 who found that the odds of heavy drinking were significant for the male sex, rural residence, higher education, and lower-income in Ghana. The respondents in this study exhibit the socio-economic traits of higher education and some with lower income.

An unhealthy diet was assessed by the addition of extra salt to prepared meals. Based on the findings, the majority of the respondents never add salt to their already prepared meals, which is 137 (66.8%). Few of the participants making 6.8% indicated adding extra salt to their diet. A high salt diet is known to predispose to hypertension, while conversely reducing dietary salt significantly reduces the blood pressure (Cappuccio et al., 2006). The respondents demonstrate generally low levels of dietary salt which is good prevention and control of hypertension.

5.4 Socio-demographic characteristics associated with the Level of Physical Activity among the study Population

The majority of respondents were males, which was interesting since studies have shown that females have better primary health-seeking behaviour thus was expected that more females will be present at the University Hospital and consequently enrolled in the study (Thompson et al., 2016). According to Ngom et al., 2003, traditional male roles lead to delays in acknowledging ill-health and seeking care. There may have been fewer females because of their reproductive roles which makes it difficult for them to

visit primary health facilities during the day, especially with an increased demand for the reproductive roles of females in taking care of the family during the current pandemic with the Coronavirus 2019 (Covid-19) (McLaren et al., 2020)

Most of those recruited for the study were between 30-39years. A study conducted in Germany indicated that people in younger age groups are more likely to seek e-health information and follow up with a hospital visit. This also applies to people with higher socioeconomic status defined by attaining higher educational level, and occupation which has a positive association with health (Nölke et al., 2015). Based on this study, there were more people of higher socioeconomic status at the University Hospital who were recruited into the study. Progressive education is linked with improved knowledge, health literacy, healthier beliefs and practices, and better health outcomes as well which may have influenced those with higher educational levels to volunteer for this study making 158 (77.1%) out of 205 respondents.

The levels of physical activity were significantly different for the sexes with males showing more physical activity across all intensity levels. There were also more females in the physically inactive group than males. They formed 47.9% of the physically inactive group. Studies by Belcher et al., 2010 revealed that there is a sharp decline in physical activity levels among the sexes after ages 13-18years with females showing steeply reducing the rate of especially vigorous-intensity activities. This is likely to be associated with earlier onset of secondary sexual characteristics in females than males as well as socially influenced reproductive roles assigned to females after that age.

Among the participants, age showed a significant association with level of physical activity, ($p<0.001$). The 30-39 years' age range was the most physically inactive 52(43.0%) as well as the group engaging in the most vigorous-intensity activity. At this age, people are at the prime of their economic activities and trying to achieve goals for

economic stability. Thus, this age group is expected to be the most engaged in their occupations. With urbanization, there has been a shift towards the use of technology as well as the desire for white colour jobs. Research findings from Petersen et al., 2010 indicate that there is a decline in physical activity for women more than for men with progressing age, however between the ages of 33-40years the decline for both age groups is not that steep. The high participation in vigorous-intensity activity may be in recreational physical activity as is common to the young age group due to the social support for exercise among peers as a form of leisure activity (Xu et al., 2017)

Across the occupations, there was a significant association with the levels of physical activity. The professional group of workers showed higher physical inactivity levels with 104 (86.0%). They also formed the majority of those engaged in light physical activity with 37(77.1%) with the non-professional group engaging in more vigorous forms of physical activity 10(55.6%). When occupation, level of education, and work department are translated into socio-economic status, these findings correlate with previous research findings where socio-economic status in urban locations influences the levels of physical activity of the people (Afrifa–Anane et al., 2015).

5.5 Level of Physical Activity among study Participants with NCD

People with or without chronic illness also exhibited differing PA levels even though the levels did not demonstrate a significant association with the state of diagnosis. However worldwide NCD have been known to cause complications that may interfere with activities of daily life and in effect physical activity levels. People living with NCD are known to have an increased sedentary behavior mostly due to disabilities caused by the diseases (Richards et al., 2016)Those without a diagnosis were more physically

active, forming 59% of those who met the WHO recommendations for PA. NCD are known to affect the DALY (Disability-adjusted life years) and YLD (Years lost to disability) of people with the diseases. Globally DALY for NCD has shown varying trends for different regions, however, most places are gradually experiencing improved QALY(quality-adjusted life-years) due to early detection and medications and surgical interventions even in Sub-Saharan Africa (Robberstad, 2009)(Gyasi, 2019). Based on the results, people living with asthma showed the lowest proportions of physical activity with no involvement in vigorous-intensity activities. A study by (Lucas & Plattsmills, 2005) showed that patients with asthma may not tolerate prolonged exercise for a long time due to the reduced lung capacity associated with the disease. Physical activity is known to be beneficial in preventing acute episodes and improving their cardiovascular health. People with asthma are advised to avoid allergens and take medications to alley the asthmatic attacks, however, an exercise prescription is not given. Thus, patients with asthma may erroneously feel that exercise is harmful to their health therefore leading to low exercise levels.

Many NCD control programs including the national policy in Ghana, have advocated the need for physical activity for both prevention and control of NCD including hypertension and Type 2 diabetes. Among the participants living with NCD, those with hypertension showed more physical activity than those with T2DM, with 22% and 8% respectively. There were however more people with hypertension who showed physical inactivity as compared to those with T2DM, which is 30% and 8% respectively. A study by Walther et al., 2017 showed that for people living with both hypertension and T2DM, there was a reduced odd of improving their healthy lifestyle scores irrespective of the disease where 25.5% of the participants were physically inactive, while 57.8% were overweight or obese. Even though there are more documentation and advocacy of

the benefits of physical activity in the prevention and management of NCD, there is also the risk of sudden cardiac death from persistent vigorous-intensity physical activity for people with underlying cardiovascular disease. Thus, patients may be erring on the side of caution by staying physically inactive (Eijkemans et al., 2012).

5.6 Level of Physical Activity in association with risk factors of NCD

The risk factors of NCD which were significantly associated with the levels of physical activity included, WHtR, number of meals during weekdays, as well as weekends, and the usual time for lunch meals according to all the categories of the generalised linear regression model shown in Table 7.

A high WHtR is a measure of increased adiposity and as such obesity. The mean WHtR from the study was 0.6 ± 0.1 which indicates that the average member of the study population was obese. The study also shows that those with higher WHtR showed more proportions of physical inactivity and less engagement in higher intensities of PA with 11.1% showing high physical activity. Some studies have argued that WHtR is a better measure of increased cardiovascular disease risk as well as the risk of other NCD since it is a better indicator of central obesity. A study by Ashwell & Gibson, 2016 indicated that WHtR was a more sensitive measure of 'early health risk' as compared to BMI. From this study, the BMI did not show a significant association with level of physical activity and this may asset the previous research findings where some at-risk people may be missed using the BMI measures. The lack of adequate levels of physical activity is an established risk factor for overweight and obesity.

The number of meals in a day whether on weekends or weekdays showed significance with the level of PA expressed by the study participants. Participants who took 3 or more meals a day showed higher levels of physical inactivity 71.9%, and 88.4% for

weekday meals, and weekend meals respectively. Participants were likely to increase meal frequency over the weekend than on weekdays. These may be an indicator of high caloric intake leading to increased metabolic stores and adiposity. The corresponding lack of engagement in recommended levels of PA for health will compound the risk of overweight and obesity and consequently increase cardiovascular disease risk amidst other NCD. According to Franko et al., 2008 a study conducted on black adolescents indicated that those who consistently had 3 or more meals a day tend to be leaner because the consistency of meals was directly associated with good quality and quantity of meals. They also pointed out that those who had regular meals were more physically active presumably because they belonged to supportive homes and the security offered the chance to engage in extended physical activity. However, for adults in this study, there seemed to be a consistency in participation in physical activity for those who had more than 3 or more meals a day as well. They formed the majority who were engaging in the different levels of physical activity as well.

Other risk factors of NCD in this study did not demonstrate a significant association with physical activity levels.

5.7 Limitations of the study

The sample size was not large enough to represent the whole population of the staff of the University of Ghana. The process of sampling was time-consuming and costly since it took a long time to attain the full sample size and PPEs had to be obtained for the period of the study.

The willingness of participants to volunteer for the study probably due to the Covid-19 scare and respondent fatigue due to the University being a regular research area were challenges that also delayed the sampling period.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The majority of the study population did not meet the WHO recommended physical activity for health value of 600MET minutes per week or more. Of those who met the criteria, the majority were involved in low-intensity physical activity. The commonest mode of reaching physical activity levels was through transportation.

More males engaged in physical activity than females at all levels of energy expenditure and all modes of exhibiting physical activity. The professional group of respondents were less physically activie than the nonprofessional group.

Physical activity levels of participants were significantly associated with high WhtR and number of meals taken per day.

6.2 Recommendation

Based on the findings of the study recommendations include:

- The University of Ghana needs a general health promotion approach to increase the physical activity levels of the staff of the Universisty of Ghana.
- The University Human Resource and Organizational Development Directorate (HRODD) directorate needs a comprehensive policy that considers the staff's physical and mental health. In collaboaration with the university Physical Development and Municipal Services (PDMSD) health-promoting practices such as permitting parking a distance from final destinations to encourage walking and creating safe and well-delineated cycling lanes with suitable

parking for people who opt to cycle to work. Also the HRODD could introduce monetary incentives for staff who cycle or walk to work instead of incentives for those with cars for its maintenance will help to improve engagement in physical activity.

- Regular compulsory health checks as part of staff annual appraisals including monitoring of risk factors for NCD with follow-ups by the HRODD in collaboration with all relevant sectors such as University Health Services including the physicians and dieticians ,and Sports Directorate on health recommendations for individual staff members who are identified to be at high risk will decrease the prevalence of risk factors among the staff members.

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APPENDIX I: CONSENT FORM

Title: [Level of Physical Activity and Prevalence of Risk Factors for Non-Communicable Diseases Among Staff of University of Ghana.]

Principal Investigator: [Josephyne Tettey]

Address: [University of Ghana, School of Public Health, Department of Social and Behavioural Sciences
P.O. Box LG 25, Legon.
Jtettey005@st.ug.edu.gh]

General Information about Research

This study is in partial fulfillment of requirements to attain a Master's in Public Health. The study is to assess the level of physical activity as well as the prevalence of risk factors of non-communicable diseases among the staff of the University of Ghana. I would like you to take part in this study which will require answering questionnaires as well as measuring the weight, height, and blood pressure of study participants. Please read, or I could explain the study further, for your understanding to assist you to choose to participate in the study or not.

Possible Risks and Discomforts

As a participant, you will have minimal harm from the study. You may have the discomfort of sparing some time to fill the questionnaires which may require about 30 minutes to complete and have their anthropometric measurements taken. You will be

allowed to fill the questionnaires and your measurements taken at your convenience without force.

Possible Benefits

By participating in this study, you will benefit from a free health screening of metabolic risk factors of non-communicable diseases. You will be notified of significant new findings acquired such as body mass index and blood pressures. If the levels are found to be high, you will be encouraged to seek prompt medical advice. Information acquired from the study will be used to promote health education and emphasize the need for prevention of noncommunicable diseases and this will help lifestyle changes and improve the general well-being of participants.

Confidentiality

Your name will not be displayed on any of the collated information which you provide during this study. Your questionnaires will be coded and information on computers will be password protected and also study materials will be kept in locked cabinets by the principal investigator. Your information will not be disclosed to any other third party.

Compensation

You will not receive monetary compensation for the study.

Voluntary Participation and Right to Leave the Research

Participation in this study is voluntary and respondents can choose not to participate or not to answer any individual questions. They will however be urged to answer all questions to provide enough data to help improve knowledge of physical activity and

the prevalence of non-communicable diseases. They can withdraw from the study at any time without any consequences.

Contacts for Additional Information

In case of concerns requiring clarity, please contact:

Principal Investigator; Josephyne Tettey (0267775522, jtettey005@st.ug.edu.gh

Your rights as a Participant

This research has been reviewed and approved by the Institutional Review Board of Noguchi Memorial Institute for Medical Research (NMIMR-IRB). If you have any questions about your rights as a research participant you can contact the IRB Office between the hours of 8 am-5 pm through the landline 0302916438 or email addresses: nirb@noguchi.ug.edu.gh

VOLUNTEER AGREEMENT

The above document describing the benefits, risks, and procedures for the research title ***(Level of Physical Activity and Prevalence of Risk Factors of Non-Communicable Diseases among Staff of the University of Ghana))*** has been read and explained to me. I have been allowed to have any questions about the research answered to my satisfaction. I agree to participate as a volunteer.

Date

Name and signature or mark of volunteer

If volunteers cannot read the form themselves, a witness must sign here:

I was present while the benefits, risks, and procedures were read to the volunteer. All questions were answered and the volunteer has agreed to take part in the research.

_____

_____

Date Name and signature of the witness

I certify that nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual.

_____

_____

Date Name Signature of Person Who Obtained Consent

APPENDIX2: DATA COLLECTION INSTRUMENTS

QUESTIONNAIRE

A. Socio-demographic data Date of interview:

Area of residence.....

Education: [ ] None [ ] Basic [ ] Secondary [ ] Tertiary

Age..... Ethnicity.....

Sex..... Household size.....

Marital status.....

How long have you been employed here?.....yrs.....months.....

B. Medical History

1. Have you received a diagnosis of any chronic illness? (Please tick where appropriate)

a) Hypertension

b) Diabetes

c) Asthma

d) Cancer

e) No

f) Other (specify).....

2. If yes, to any of the chronic illnesses, are you on any medication? [ ] Yes [ ] No

3. Have you been at any time been considered by close friends as overweight?

[ ] Yes [ ] No

4. Do you consider yourself overweight? [ ] Yes [ ] No [ ] Do not know

5. BP MEASUREMENT(mmHg) .....

6. WAIST CIRCUMFERENCE.....

6. WEIGHT (kg) .....

7. HEIGHT (m) .....

8. BMI (kg/m2) .....

C. Physical Activity Using the Global Physical Activity Questionnaire (attached)

D. Smoking History

1.Have you ever smoked tobacco?

[ ] Yes [ ] No

2. If yes, for how long .....

3. How many sticks a day on average do or did you smoke in a day?

please specify.....

4.Calculated pack years. (Number of packs per day x number of years of smoking).....

E. Alcohol Consumption

1. Have you ever consumed a drink that contains alcohol such as beer, spirits, fermented palm wine,

pito, etc? [ ] Yes [ ] No

2. Currently, how often do you consume drinks that contain alcohol?

[ ] Daily [ ] More than three times per week [ ]Two to three times a week

[ ] Rarely/Occasionally

3.How many glasses of an alcoholic drink do you have in a day?

[ ]1glass [ ] 2 glasses [ ]3 glasses [ ]Other specify.....

F. Dietary Habits

1. In the last 7 days, how many times did you eat breakfast?

a) Once

b) 2 to 3 times

c) 4 to 5 times

d) 6 to 7 times

e) Never skipped

2. Where did you have breakfast in the last week? (Please indicate the number of times per option)

a.) At home..... b) At work..... c) Skipped.....

2. Excluding snacks, how many meals do you usually have on a weekday?.....

(snacks include pastries, nuts, soft drinks/beverages, chocolate, ice cream, etc.)

2b. Excluding snacks, how many meals do you usually have on weekends?.....

(snacks include pastries, nuts, soft drinks/beverages, chocolate, ice cream, etc.)

3. How many times do you have snacks in a day?.....

(snacks include pastries, nuts, soft drinks/beverages, chocolate, ice cream, etc.)

4. When eating, do you add salt to your already prepared meal?

a.) Always b) Sometimes c) Rarely d) Never

5. At what time do you usually have lunch?.....

6. At what time do usually have supper?.....

7.How often do you eat food from fast food joint/outlet? (fast food meals include fried rice, burger, steak, pizza, etc)

a) Always b) Sometimes c) Rarely d) Never

8. In the last 7 days, on how many times have you bought/eaten fast food? (fast food meals include fried rice, burger, steak, pizza, etc)

a) Never b) Up to 5 times c) More than 5 times d) Up to 10 times

Global Physical Activity Questionnaire (GPAQ)

WHO STEPwise approach to NCD risk factor surveillance

Surveillance and Population-Based Prevention
Prevention of Noncommunicable Diseases Department
World Health Organization
20 Avenue Appia, 1211 Geneva 27, Switzerland
For further information: www.who.int/chp/steps

GPAQ

Physical Activity

Now I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person.

Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment. [Insert other examples if needed]. 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.

	Questions	Response	Code
Activity at work			
1	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like [carrying or lifting heavy loads, digging or construction work] for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P 4*	P1
2	In a typical week, on how many days do you do vigorous-intensity activities as part of your work?	Number of days [__]	P2
3	How much time do you spend doing vigorous-intensity activities at work on a typical day?	Hours : minutes [__][__] : [__][__] hrs mins	P3 (a-b)
4	Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking [or carrying light loads] for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P 7*	P4
5	In a typical week, on how many days do you do moderate-intensity activities as part of your work?	Number of days [__]	P5
6	How much time do you spend doing moderate-intensity activities at work on a typical day?	Hours : minutes [__][__] : [__][__] hrs mins	P6 (a-b)
Travel to and from places			
The next questions exclude the physical activities at work that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship. [Insert other examples if needed]			
7	Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places?	Yes 1 No 2 *If No, go to P 10*	P7
8	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days [__]	P8
9	How much time do you spend walking or bicycling for travel on a typical day?	Hours : minutes [__][__] : [__][__] hrs mins	P9 (a-b)
Recreational activities			
The next questions exclude the work and transport activities that you have already mentioned. Now I would like to ask you about sports, fitness and recreational activities [leisure]. [Insert relevant terms]			
10	Do you do any vigorous-intensity sports, fitness or recreational [leisure] activities that cause large increases in breathing or heart rate like [running or football] for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P 13*	P10
11	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational [leisure] activities?	Number of days [__]	P11
12	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Hours : minutes [__][__] : [__][__] hrs mins	P12 (a-b)

Continued on next page

GPAQ, Continued

Physical Activity (recreational activities) contd.			
Questions		Response	Code
13	Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that causes a small increase in breathing or heart rate such as brisk walking, cycling, swimming, volleyball for at least 10 minutes continuously? *[INSERT EXAMPLES] [USE SHOWCARD]*	Yes 1 No 2 If No, go to P16	P13
14	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (leisure) activities?	Number of days __	P14
15	How much time do you spend doing moderate-intensity sports, fitness or recreational (leisure) activities on a typical day?	Hours : minutes __ : __ hrs mins	P15 (a-b)
Sedentary behaviour			
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, train, reading, playing cards or watching television], but do not include time spent sleeping. *[INSERT EXAMPLES] [USE SHOWCARD]*			
16	How much time do you usually spend sitting or reclining on a typical day?	Hours : minutes __ : __ hrs mins	P16 (a-b)

APPENDIX 3: ETHICAL CLEARANCE

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ETHICAL CLEARANCE

FEDERALWIDE ASSURANCE FWA 00001824 **IRB 00001276**

NMIMR-IRB CPN 059/19-20 **IORG 0000908**

On 2nd September 2020, the Noguchi Memorial Institute for Medical Research (NMIMR) Institutional Review Board (IRB) at a full board meeting reviewed and approved your revised protocol titled:

TITLE OF PROTOCOL : **Level of physical activity and prevalence of risk factors for Noncommunicable diseases among staff of University of Ghana**

PRINCIPAL INVESTIGATOR : **Josephine Tetley, MPH Cand.**

Please note that a final review report must be submitted to the Board at the completion of the study. Your research records may be audited at any time during or after the implementation.

Any modification of this research project must be submitted to the IRB for review and approval prior to implementation.

Please report all serious adverse events related to this study to NMIMR-IRB within seven days verbally and fourteen days in writing.

This certificate is valid till 1st September, 2021. You are to submit annual reports for continuing review.

Signature of Chair: .....
Dr. Abraham Hodgson
(NMIMR – IRB CHAIR)