

**SCHOOL OF PUBLIC HEALTH  
COLLEGE OF HEALTH SCIENCES  
UNIVERSITY OF GHANA**



**BARRIERS AND MOTIVATORS TO PHYSICAL ACTIVITY AMONG STAFF OF  
TEMA DEVELOPMENT CORPORATION**

**BY**

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AWARD OF THE MASTER OF PUBLIC HEALTH (MPH) DEGREE**

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**INTEGRI PROCEDAMUS**

## DECLARATION

I, **Kojo Edumadze Aikins** declare that apart from specific references made which have been duly acknowledged, this research is my independent work undertaken under the supervision of Dr. John Arko-Mensah. I also declare that no part of this dissertation has been submitted for the award of any degree in this University or any University elsewhere.



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## DEDICATION

I dedicate this dissertation to my father Prof. Moses Aikins and to my mother Mrs. Brendalyn Aikins whose continuous love, support, motivation, and guidance have made it possible for me to begin and complete this academic work.



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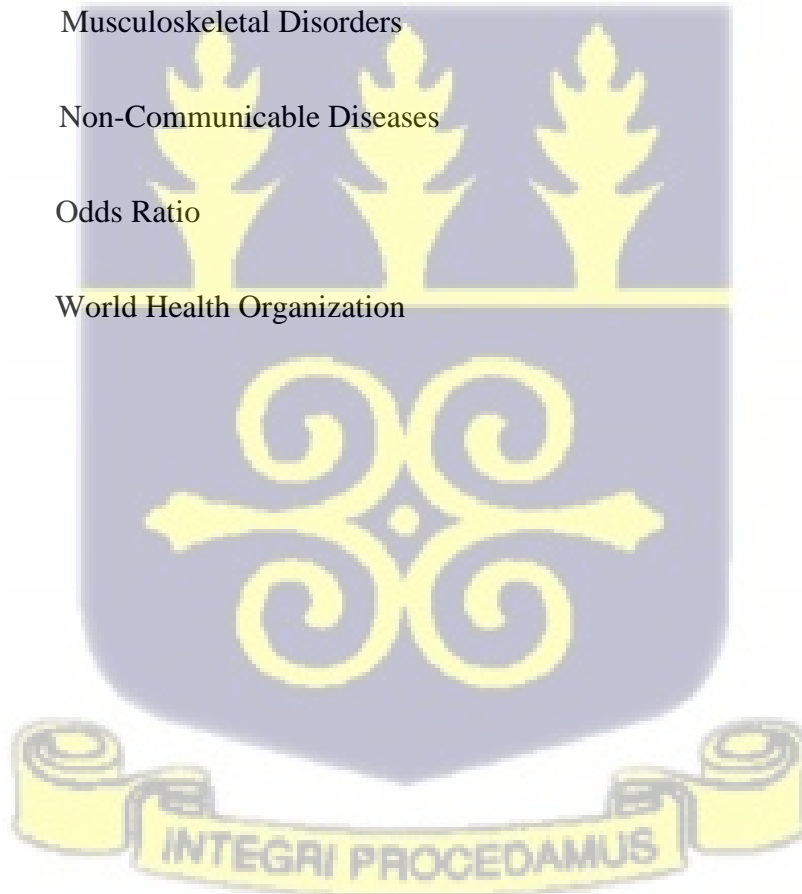
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**List of acronyms**

CI	Confidence Interval
EBBS	Exercise Benefits / Barriers Scale
DALYs	Disability-Adjusted Life Years
GDP	Gross Domestic Product
IPAQ-SF	International Physical Activity Questionnaire-Short Form
MET	Metabolic Equivalent
MSDs	Musculoskeletal Disorders
NCDs	Non-Communicable Diseases
OR	Odds Ratio
WHO	World Health Organization



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## Definition of operational terms

Physical activity

Bodily movement produced by skeletal muscles that requires energy expenditure.

Sedentary work

Work that involves only little amounts of physical activity carried out for long periods of time.

Physical activity barriers

Physical, mental or socio-economic limitations that hamper the maintenance of moderate to vigorous levels of physical activity.

Physical activity motivators

Perceived benefits that can be derived from the maintenance of moderate to vigorous levels of physical activity.



## ABSTRACT

**Introduction:** Physical inactivity, a major risk factor of Non-Communicable Diseases, is reportedly on a global rise despite the existence of authentic information on the benefits of physically activity on health. Occupations involving low physical energy expenditure predispose workers to developing NCDs and musculoskeletal disorders. Investigating the barriers and motivators to physical activity among such workers could help implement measures that will motivate them to be physically active, thus promoting good health.

**Objective:** The aim of this study was to determine the physical activity levels, barriers, and motivators among staff of Tema Development Corporation.

**Methods:** This study was a cross-sectional study that sampled 108 TDC staff from the 5 main departments using the stratified proportionate sampling method. Staff selection was based on one's presence at work at the time of data collection, and also not being physically challenged. A semi-structured questionnaire was used to collect data on sociodemographic characteristics. Physical activity levels were measured using the International Physical Activity Questionnaire - Short Form, and physical activity motivators and barriers were assessed using the Exercise Benefits / Barriers Scale. Statistical analysis was done using STATA 16.0 and EPIInfo 7.2.5.

**Results:** Median age of study participants was 27.5 years. Participants reported the improvement of physical fitness and the unavailability of exercise centres in their residential areas as their biggest physical activity motivator and barrier respectively. Overall, 45% of respondents reported high physical activity levels, of which 53% were males and 39% were females; about 37% of these participants were <29 years old, 48% were unmarried, 38% were from the Administration Department, and 64% enjoyed exercising. The median number of daily sitting hours was 6 hours.

Participants' age and sex were significantly associated with physical activity levels ( $p > 0.032$ ,  $p > 0.044$  respectively).

**Conclusion:** The staff of TDC reported moderate and high physical activity levels; they also reported the unavailability of exercise centres as a major barrier to exercising while the improvement of physical fitness was a major motivator to exercising.



## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 Background

Indulgence in regular physical activity continues to be one of the most important ways of promoting physical health and preventing the development of some Non-Communicable Diseases (NCDs). These diseases are on an alarming rise especially in low- and middle-income countries (Osei et al., 2021; Uffelen et al., 2017). The World Health Organization (WHO) made recommendations for adults to perform a weekly minimum of 150 minutes of moderate or 75 minutes of vigorous physical activity for the achievement of long-lasting physical health benefits (Gupta & Varghese, 2019; Kruk, 2014). In spite of the well-documented benefits of indulging in regular physical activity, there still exists a global pattern of physical inactivity (Gaetano, 2016 & González et al., 2017). Though some possible explanations for this phenomenon could be the annual increase in the number of sedentary jobs globally (Carr et al., 2016) and technological advances in certain fields that reduce the need for significant amounts of physical activity in performing tasks (Mailey et al., 2016), it is important to investigate the actual reasons why there seems to be an underappreciation of regular physical activity worldwide.

Internationally, barriers and motivators to physical activity have been qualitatively and quantitatively studied. Typically, the barriers to achieving moderate to vigorous physical activity levels differ across different socio-demographic categories such as age, sex, and type of occupation (Aaltonen, 2012 & Ashton et al., 2017). Various studies conducted on the barriers to physical activity revealed that some of the most common barriers are lack of motivation, lack of time due to busy schedules and health problems (Yarmohammadi et al., 2017 & Zalewski et al., 2014).

Distance from exercise and fitness centres was one of the most prominent barriers identified in previously conducted studies in Africa (Aro et al., 2010 & Shehu et al., 2013).

Motivators to physical activity typically encompass the perceived benefits of indulging in moderate to vigorous physical activity regularly (Teixeira et al., 2012 & Webb et al., 2022). From previous studies, some of the most commonly reported motivators are improving overall health, improving mood, a better physical appearance, and increasing strength (Bakinde, 2022). Other extraneous factors such as influence from family members and weather conditions could be regarded as both barriers and motivators to physical activity as these could have both a facilitatory and inhibitory effect on the will to exercise (Boutevillain et al., 2017). Similar studies conducted in Africa identified encouragement from health workers as another important motivator (Aro et al., 2010 & Kgekong & Parker, 2020).

People involved in occupations that largely require low levels of physical activity are referred to as sedentary workers irrespective of their indulgence in regular physical activity outside their regular working hours (George et al., 2013 & Tremblay et al., 2017). Such occupations typically involve the maintenance of static postures like sitting for hours (Carr et al., 2016; González et al., 2017; Veer et al., 2018). In addition to the risk of developing musculoskeletal disorders (MSDs), such workers gradually become predisposed to developing diseases affecting cardiovascular health (Addo et al., 2015 & Dempsey et al., 2020). This study, therefore, seeks to determine home and work-related factors that either motivate or hinder workers at TDC from achieving healthy physical activity levels, with an overarching aim of promoting health and reducing the risk of developing NCDs and MSDs.

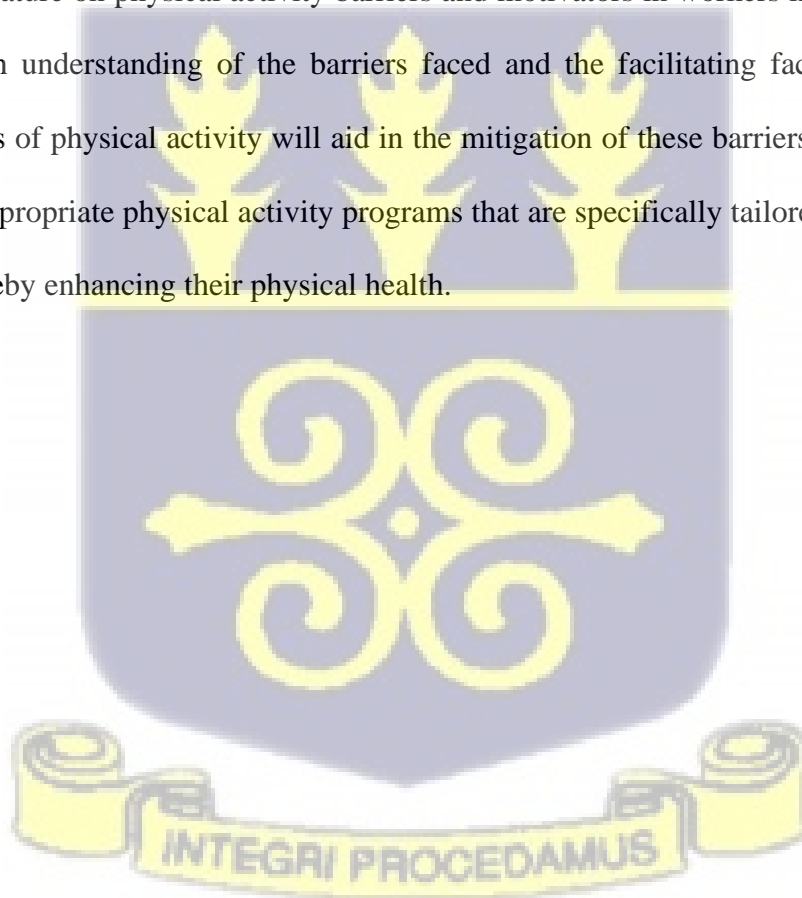
## 1.2 Problem statement

The burden of NCDs been on an expected global rise given the current levels of physical inactivity among other factors such as poor eating habits and alcohol use (Anane et al., 2015 & Ashton et al., 2017). The industrial revolution and the advancement in technology have gradually introduced automation and more efficiency in task performance, and have therefore greatly reduced the need for considerable amounts of physical exertion and energy expenditure in performing even the simplest of tasks (Mittal & Bansal, 2019). The result of this is a cumulative reduction in physical activity levels and consequently, a decline in physical health. Occupations that involve low amounts of physical activity have also been linked with the development of some prominent musculoskeletal conditions such as low back and neck pain (Andrasfay et al., 2021).

According to WHO, a reported number of 41 million deaths occur annually as a direct result of NCDs (WHO, 2021). Majority of these deaths reportedly occur in Africa with approximately half of the total number of annual deaths in Ghana being attributed to NCDs (W.H.O, 2022). In Ghana, certain subregions have reported a high prevalence of NCD risk factors (Osei et al., 2021). Among those risk factors is physical inactivity which is common in office workers such as those who work in public corporations like Tema Development Corporation (TDC) due to the sedentary nature of the work and the prolonged maintenance of static positions at work. Additionally, in the informal sector, people like market traders and other petty traders also spend several hours sitting to sell their goods, and this also contributes to the high physical inactivity levels among workers in the country. The global magnitude of morbidity suffered from the development of work-related musculoskeletal disorders is also well-documented (Woolf, 2015 & Zitko et al., 2021). Some African authors have acknowledged the scarcity of published studies on work-related MSDs in Africa (Gcelu & Kalla, 2015) and in Ghana (Boakye et al., 2018 & Osei et al., 2021).

The widespread nature of these problems invariably translates into huge economic burdens on respective national economies and health systems. In 2014, an estimated amount of US\$ 980 billion was also spent on the treatment of work-related musculoskeletal problems, accounting for 5.76% of their annual Gross Domestic Product (GDP) ( United States Bone and Joint Initiative, 2014). WHO has estimated that low- and middle-income countries will reportedly spend more than US\$ 7 trillion on the treatment of NCDs between 2011 and 2025 (Chigom, 2017).

Efforts to produce long-lasting solutions to these phenomena must be preceded by probing into the internal and external influences that govern people’s physical activity behaviours. There is a dearth of scientific literature on physical activity barriers and motivators in workers in public Ghanaian corporations. An understanding of the barriers faced and the facilitating factors in achieving significant levels of physical activity will aid in the mitigation of these barriers and the effective structuring of appropriate physical activity programs that are specifically tailored to suit all kinds of workers, thereby enhancing their physical health.



### 1.3 Conceptual framework

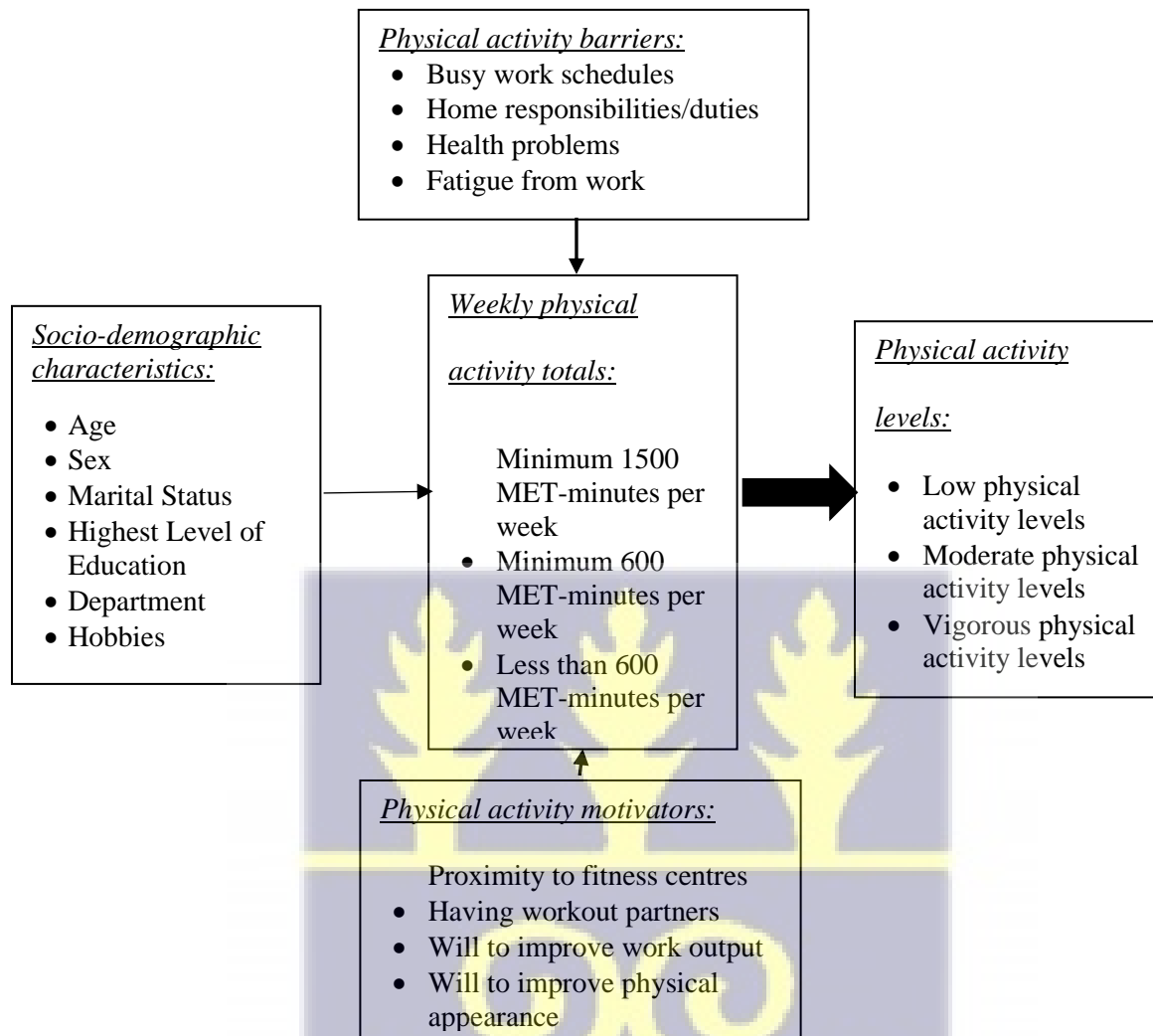
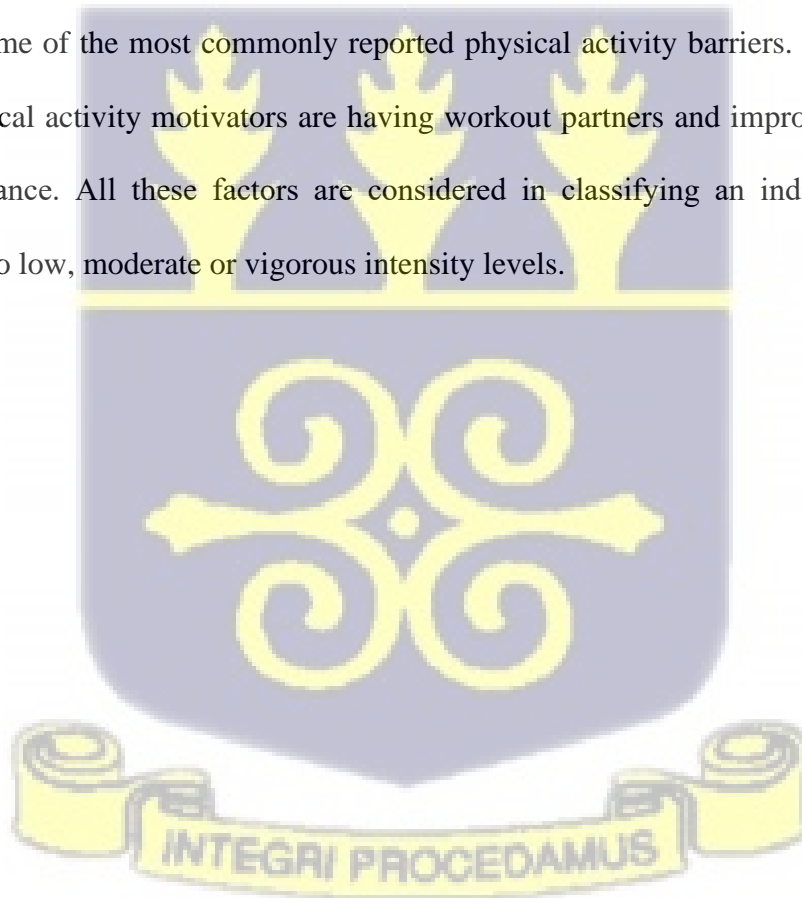


Figure 1: Conceptual framework of physical activity levels, barriers and motivators among Tema Development Corporation staff

Figure 1 shows the conceptual framework for this study assessing motivators and barriers to physical activity among Tema Development Corporation Staff. This framework was conceptualized after reviewing scientific literature on physical activity (González et al., 2017; Gupta & Varghese, 2019; Kruk, 2014; W.H.O, 2021), physical activity barriers (Ashton et al., 2017; Yarmohammadi et al., 2017; Zalewski et al., 2014) and motivators (Aaltonen, 2012; Boutevillain et al., 2017; Webb et al., 2022). The socio-demographic characteristics (such as

marital status and specific type of occupation) of the staff will largely determine their physical activity behaviours. Other factors such as physical activity barriers and motivators also influence the efforts that these staff make to achieve moderate to vigorous amounts of physical activity per week. These factors could be home or office-related. Barriers to physical activity usually limit such workers to only performing low amounts of physical activity during the week (less than 600 MET-minutes per week), which could cumulatively become detrimental to their health. Motivators to physical activity generally facilitate moderate (600 MET-minutes per week) to vigorous levels of physical activity (1500 MET-minutes per week) in staff because of the perceived benefits to indulging in such levels of physical activity. The lack of time due to busy schedules and health problems are some of the most commonly reported physical activity barriers. Some of the most prominent physical activity motivators are having workout partners and improved perception of physical appearance. All these factors are considered in classifying an individual's physical activity level into low, moderate or vigorous intensity levels.



#### **1.4 Justification of study**

Individual perceptions and beliefs about a certain activity largely determine behaviours towards that activity. Most public health interventions concerning physical activity mainly focus on laying emphasis on the importance of adopting lifestyles that encourage regular moderate to vigorous physical activity levels. There must be an additional consideration of the reasons leading people to develop negative physical activity behaviours despite the wealth of information on the importance of being physically active. This can possibly improve the success of such interventions. Ghana experiences approximately 86,000 deaths each year; more than half of these deaths occur in individuals under the age of 70 (Ghana Ministry of Health, 2017). Due to low energy expenditure and low physical activity demands at work, workers at the Tema Development Corporation (TDC) who mostly engage in sedentary work may possibly be at risk of developing certain NCDs and MSDs which have physical inactivity as a main risk factor. An assessment of their respective physical activity levels and physical activity barriers and motivators will foster a better understanding of the challenges and facilitators to achieving good physical health and help guide interventions geared towards reducing the risk of the development of the aforementioned diseases.

#### **1.5 General objective**

The aim of this study was to determine the physical activity levels and motivators and barriers to indulging in regular physical activity among Tema Development Corporation staff.

##### **1.5.1 Specific objectives**

The specific objectives are to:

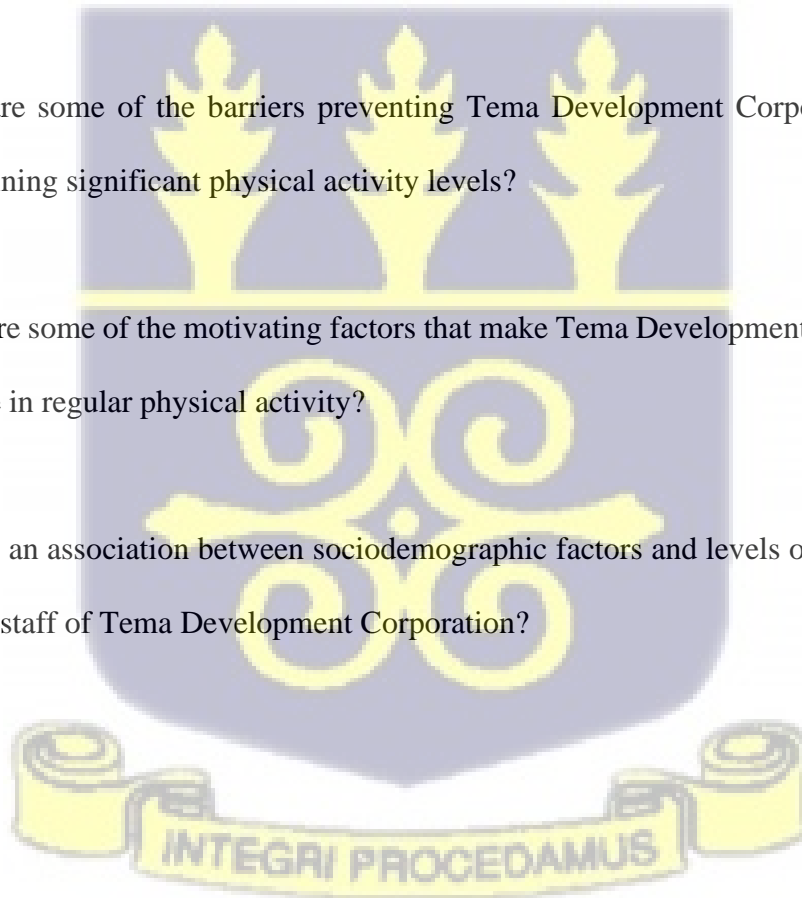
1. Assess the levels of physical activity among staff of Tema Development Corporation

2. Identify the motivators to physical activity among staff of Tema Development Corporation
3. Identify barriers to physical activity among staff of Tema Development Corporation
4. Determine the association between socio-demographic factors (home and work-related factors) and physical activity levels among staff of Tema Development Corporation.

### 1.5.2 Research questions

The research questions are:

1. What are the current levels of physical activity among staff of Tema Development Corporation staff?
2. What are some of the barriers preventing Tema Development Corporation staff from maintaining significant physical activity levels?
3. What are some of the motivating factors that make Tema Development Corporation staff indulge in regular physical activity?
4. Is there an association between sociodemographic factors and levels of physical activity among staff of Tema Development Corporation?



## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 Introduction

The scientific literature reviewed in this section were acquired from online databases such as Science Direct, PubMed, Hinari, Google Scholar, African Journals Online, and Research Gate.

In the contemporary world characterized by the massive strides made in the field of technology, the value placed on the health-promoting effects of regular physical activity seems to be gradually depreciating across all age groups (W.H.O, 2021). Coupled with the egression of the recent global health pandemic COVID-19, physical inactivity in this era may be approaching an all-time low (Woods et al., 2020). These two events may have precipitated an increase in the number of jobs that require low levels of energy expenditure worldwide, thereby leading workers to develop sedentary lifestyles (Dempsey et al., 2020 & González et al., 2017). Consequently, the risk of developing certain NCDs such as heart attacks and stroke have been on a gradual annual increase (Lucia, 2021, W.HO, 2021; WHO, 2022). There is also the increased burden of work-related musculoskeletal disorders for these workers owing to the amount of time spent in certain static working positions and the inappropriateness of body biomechanics (Boakye et al., 2018; Webb et al., 2022; Woolf, 2015).

Many studies have been conducted in an effort to understand people's perceptions and behaviours towards physical activity and how that may explain the low levels of physical activity worldwide. It is understood that behavioural change may be the biggest driver for more indulgence in significant amounts of regular physical activity (Andrasfay et al., 2021) which could help produce a healthier workforce for the nation. This chapter therefore seeks to review literature on physical activity levels, the benefits of physical activity in reducing the burden of NCDs and work-related

MSDs, on barriers to physical activity and motivators to physical activity as well as their respective quantitative assessment tools.

## **2.2 Physical activity**

Physical activity refers to any bodily movement that requires a significant amount of energy expenditure; these movements can range from basic daily activities like walking or performing household chores to more physically demanding activities like cycling and running (WHO, 2018). In order to maintain healthy levels of physical activity, W.H.O made recommendations for adults to perform a weekly minimum of 150 minutes of moderate physical activity or 75 minutes of vigorous physical activity (Gupta & Varghese, 2019; Kruk, 2014; Veer et al., 2018). Hence, failure to meet these weekly requirements render one to be physically inactive. A gradual decrease in levels of physical activity has been acknowledged by various studies. Physical inactivity is considered to be one of the most significant modifiable risk factors to the development of NCDs (Gaetano, 2016; González et al., 2017; Tremblay et al., 2017). Improvements in overall physical activity levels could therefore be instrumental in reducing the global burden of NCDs.

In determining physical activity levels, special consideration is usually given to the metabolic equivalent (MET) demands of specific activities (Meh et al., 2021). MET is defined as the amount of energy consumed by the body while at rest; with healthy adults usually expending approximately 3.5 ml O<sub>2</sub>/kg/min when at rest (Ács et al., 2020). Typically, activities like sitting and walking leisurely are considered as low intensity activities and would require less than 4 METs, moderate intensity activities like cycling would require 4-6 METs, and vigorous activities like running would require 6-8 METs (Ács et al., 2020; Laeremans et al., 2017; Uffelen et al., 2017). These classifications are usually achieved using standardized tools for measuring physical activity.

### 2.3 Physical activity assessment tools

Several objective physical activity assessment tools have been created over the years to be used to quantify levels of physical activity in different populations. The data collected with these tools can help estimate the average physical health profiles of these populations. Among the most common physical activity assessment tools are the original 30-item Participation Motivation Questionnaire and the 23-item Motivation for Physical Activity Measure (Molanorouzi, 2015). A common complaint by authors who have used these tools is the relatively bulky nature of these tools given the number of question items they have (Keating et al., 2019). This has led many of these authors to settle for the less cumbersome International Physical Activity Questionnaire-Short Form (IPAQ-SF).

The International Physical Activity Questionnaire-Short Form is a standardized questionnaire used by various authors to quantitatively measure physical activity levels in prevalence studies and to classify them into low, moderate and vigorous levels (George et al., 2013; Kang et al., 2021 Nyawornota et al., 2013) . This questionnaire is reported to be the most widely used questionnaire in assessing physical activity levels (Meh et al., 2021). The consistently high reliability of this tool (usually ranging from 0.66 to 0.88) has been established by various studies (Lee et al., 2011). The questionnaire comprises 7 question items that ask about time spent indulging in certain low, moderate and low intensity physical activities during the last 7 days, with the answers provided in hours or minutes. Total scores are expressed in MET-minutes per week as the time spent performing each activity is multiplied by the MET required to perform that activity. The final question on this questionnaire asks about the number of hours spent sitting in a day.

Despite its high reliability, the IPAQ-SF has been said to have some shortcomings. A study conducted by Lee *et al* (2011) on the validity of the IPAQ-SF revealed that there was a high

potential for the overreporting or underreporting of time spent performing physical activity, thereby affecting the correlation between the actual time spent doing physical activity and the reported time. Observations like this led to the development of the Global Physical Activity Questionnaire (GPAQ) by WHO in 2005 (Keating et al., 2019; Laeremans et al., 2017; Singh & Purohit, 2011). This modified 16-question assessment tool was created to collect more specific data regarding physical activities performed at work, during travel and recreational physical activities, with provisions made for the recording of data concerning physical activity intensity, duration and frequency (Cleland et al., 2014; Meh et al., 2021; WHO, 2005).

Despite these reported shortcomings, the IPAQ-SF remains one of the most reliable, popular, and time-effective methods of recording data on physical activity levels in prevalence studies.

#### **2.4 Relationship between physical inactivity and development of NCDs**

Global statistics on the occurrence of NCDs are closely monitored as these diseases account for the highest number of deaths in the world every year. In 2016, WHO reported that about 41 million deaths (70 % of total global deaths) occurred as a result of NCDs, with roughly 15 million of those deaths occurring in individuals between the ages of 30 and 69 (Kang et al., 2021; Osei et al., 2021; WHO, 2018). This is an indication of the increasing NCD prevalence in the younger and middle-aged populations that make up the majority of every nation's workforce. A factsheet released by WHO (2021) reported that over 70% of NCD-related deaths occurred in low- and middle-income countries with cardiovascular diseases accounting for the highest number of NCD-related deaths. Current data on NCDs in Africa suggest that Nigeria experiences the highest number of NCD-related deaths (approximately 447,800 deaths) with South Africa attributing over 51% of their total deaths to NCDs (WHO, 2022). The WHO 2016 Health Profile for Ghana also reported that NCD-

related deaths made up for approximately 43% of the total annual deaths, with 19% of that figure attributed solely to cardiovascular diseases (Dzradosi & Kushitor, 2020 & WHO, 2018).

Indulgence in regular physical activity has been identified as one of the surest ways of reducing the risk of development of NCDs, as this helps break the pattern of physical inactivity in sedentary workers. Regular physical activity has been reported to play a major role in preventing and managing hypertension and in preventing obesity (Luke et al., 2011 & WHO, 2018). It is also known to influence a positive caloric balance in human body systems and an improved systemic circulation in the cardiovascular system (Gaetano, 2016). Some positive psychological benefits have been linked to the indulgence in regular physical activity as it is reportedly evokes a positive body image and improves confidence, thereby promoting mental health and a willingness to continue being physically active (Molanorouzi, 2015; & Woods et al., 2020). This is especially important as an individual's psychological state of mind will to some extent influence his or her will to indulge in regular physical activity. Most of these benefits of regular physical activity are linked to the maintenance of moderate to vigorous physical activity levels, with little physical or psychological benefit being derived from the maintenance of low physical activity levels (Carr et al., 2016; Cleland et al., 2014; Veer et al., 2018).

### **2.5 Relationship between physical inactivity and development of MSDs**

Musculoskeletal Disorders are known to be the biggest contributors to Disability-Adjusted Life Years (DALYs) worldwide (Gcelu & Kalla, 2015; Woolf, 2015; Zitko et al., 2021). An estimated 1.7 billion people live with some form of musculoskeletal condition, with 568 million of these people suffering from low back pain which is the single largest contributor to global disability (WHO, 2021). A considerable number of MSDs are thought to originate from workplaces where most individuals spend the majority of their day or week. Work-related MSDs are the biggest

reasons for absenteeism, sick leaves and disability at most workplaces, thereby greatly affecting work productivity (Gideon et al., 2021; Kinge et al., 2015; Smythe et al., 2017; WHO, 2021). A systematic review and meta-analytical study conducted by Morris *et al* (2018) to investigate the prevalence of low back pain in Africa reported after reviewing and analyzing 66 studies that the annual and point prevalence of low back pain in Africa were 47% and 57% respectively. These studies suggest that low back pain is the most prevalent MSD worldwide, and this condition has a strong correlation with the maintenance of static postures at work (González et al., 2017).

Low back pain, especially in the sedentary working population, typically responds positively to improvements in physical activity patterns both at work and outside work. Regular physical activity helps reduce the static load placed on muscles during prolonged sitting which is one of the major ergonomic factors leading to the development of low back pain (WHO, 2021). Contrary to old beliefs that physical activity worsens low back pain, the muscles of physically active individuals are less prone to injury caused by the prolonged maintenance of static positions due to the improved strength, flexibility and adaptability of these muscles as a result of them being regularly engaged in physical activity (Amit et al., 2013 & Jespersen et al., 2012). Regular indulgence in moderate to vigorous physical activities is also commonly recommended for people already experiencing some degree of low back pain (Gordon & Bloxham, 2016). Improvements in overall health outcomes, however, are strongly linked to the adherence in regular physical activity regimes in combination with home physical exercise programs recommended by physiotherapists (Meh et al., 2021 & Sallis, 2015).

## **2.6. Barriers to physical activity**

Barriers to physical activity refer to the physical, mental or socio-economic limitations that hamper the achievement or maintenance of moderate levels of physical activity. The lack of motivation

and lack of time due to busy schedules have been widely reported to be the most common physical activity barriers (Shehu et al., 2013; Mailey et al., 2016; Zalewski et al., 2014). A study conducted by Boutevillain *et al* (2017) to investigate the barriers and facilitators to physical activity in chronic low back patients in France identified some other lesser-known barriers such as the lack of perceived benefits, lack of family support, and poor weather. Another study conducted by Hamer *et al* (2021) in England investigated the possibility of fear being a major psychological barrier to physical activity. The results of the study indicated that study participants mostly possessed the fears of embarrassment, of falls, of joint damage and of cardiac events.

### **2.7. Motivators to physical activity**

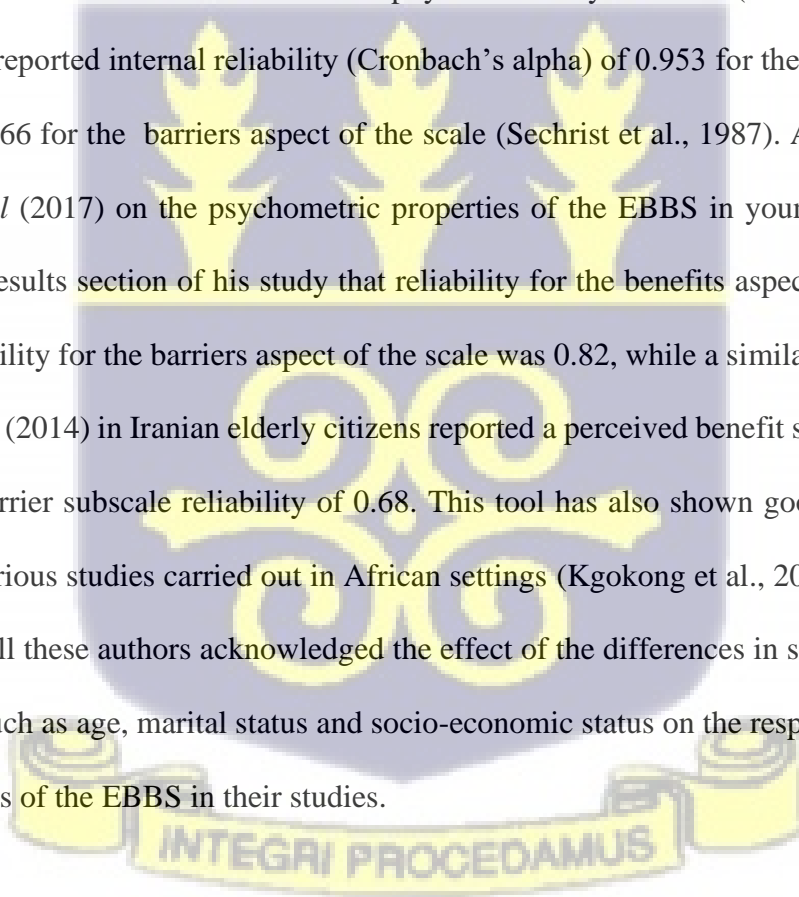
Motivators to physical activity are generally described as the perceived benefits of indulging in regular physical activity. Many studies have identified improved health outcomes as one of the most prominent physical activity motivators (Aaltonen, 2012; Costello et al., 2011; Uffelen et al., 2017). Motivation for physical activity tends to vary across different age groups, as depicted by a study conducted by Ashton *et al* (2017) in Australian men aged 18-25. The results of this study revealed that these men rated improving body image and fitness as higher motivators as compared to improving overall health. Other more commonly reported physical activity motivators across all age groups are improved sleep, improved physical strength, stress management, improved mood, opportunities to socialize and make new friends, and weight loss (Boutevillain et al., 2017; Molanorouzi, 2015; Thomson et al., 2016).

### **2.8 Physical activity barriers and motivators assessment tools**

Barriers and motivators to physical activity are mostly assessed qualitatively or through online systematic reviews and meta-analyses of published studies (Ashton et al., 2017; Costello et al., 2011; Webb et al., 2022). These two concepts are also usually considered separately when they

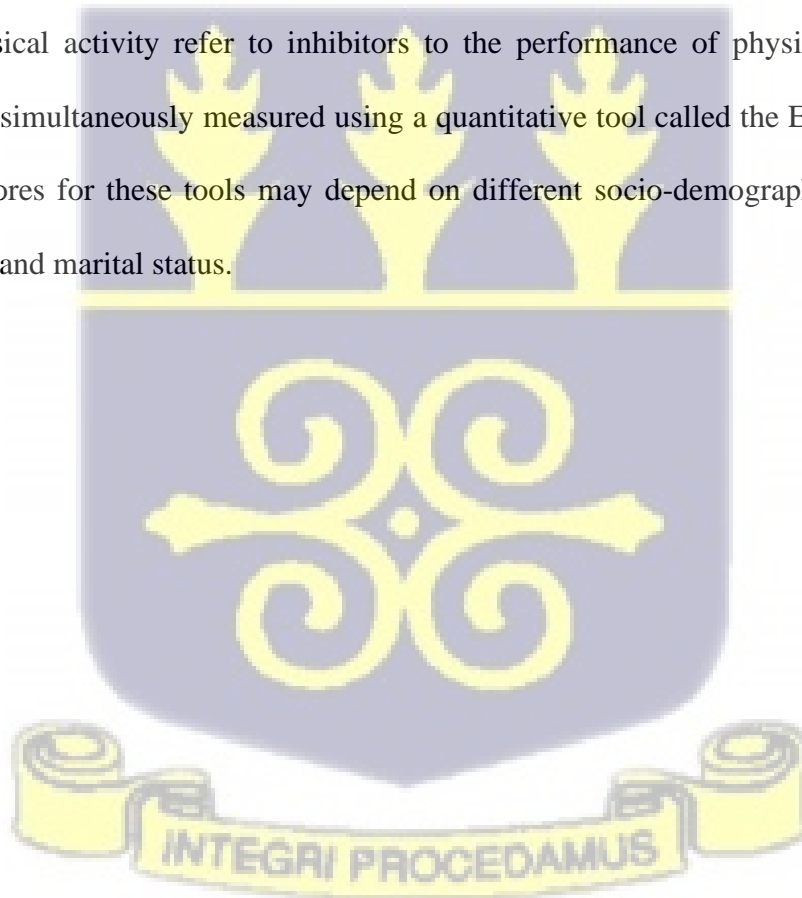
are being assessed quantitatively. Among the most common physical activity barrier assessment tools are the Barriers to Being Physically Active Questionnaire and the Inventory of Physical Activity Barriers scales (Wingood et al., 2021). The Physical Activity and Leisure Motivation Scale is currently the most commonly used quantitative physical activity motivator assessment tool (Molanorouzi, 2015). Till date, The Exercise Benefits/ Barriers Scale (EBBS) remains one of the most valid and reliable standard measures used to simultaneously measure physical activity motivators and barriers (Enríquez-Reyna et al., 2017; Kamrani et al., 2014; Thomson et al., 2016).

The Exercise Benefits/ Barriers Scale is a standardized tool created by Sechrist *et al* in 1987 to measure the perceived benefits and barriers to physical activity in adults (Farahani et al., 2017). This scale has a reported internal reliability (Cronbach's alpha) of 0.953 for the benefits aspect of the scale and 0.866 for the barriers aspect of the scale (Sechrist et al., 1987). A study conducted by Farahani *et al* (2017) on the psychometric properties of the EBBS in young Iranian women revealed in the results section of his study that reliability for the benefits aspect of the scale was 0.94 while reliability for the barriers aspect of the scale was 0.82, while a similar study conducted by Kamrani *et al* (2014) in Iranian elderly citizens reported a perceived benefit subscale reliability of 0.94 and a barrier subscale reliability of 0.68. This tool has also shown good reliability after being used in various studies carried out in African settings (Kgokong et al., 2009 & Kgokong & Parker, 2020). All these authors acknowledged the effect of the differences in socio-demographic characteristics such as age, marital status and socio-economic status on the respective reliabilities of both sub scales of the EBBS in their studies.



## 2.9. Conclusion

Current trends in public health suggest that NCD prevalence is on the rise especially in low- and middle-income countries, with physical inactivity being one of the key determinants of this alarming rise. Musculoskeletal disorders also appear to be one of the most debilitating problems that lead people to experience difficulty in performing their normal daily activities. The maintenance of regular moderate to vigorous physical activity levels are instrumental in reducing the risk of developing these diseases. Physical activity levels are usually quantitatively measured using standardized tools such as the IPAQ-SF which is a tool popular for its high reliability. Motivators to physical activity refer to the perceived benefits in indulging in physical activity. Barriers to physical activity refer to inhibitors to the performance of physical activity. Both concepts can be simultaneously measured using a quantitative tool called the EBBS. Differences in individual scores for these tools may depend on different socio-demographic characteristics such as age, sex and marital status.



## CHAPTER THREE

### 3.0 METHODS

#### 3.1 Study design

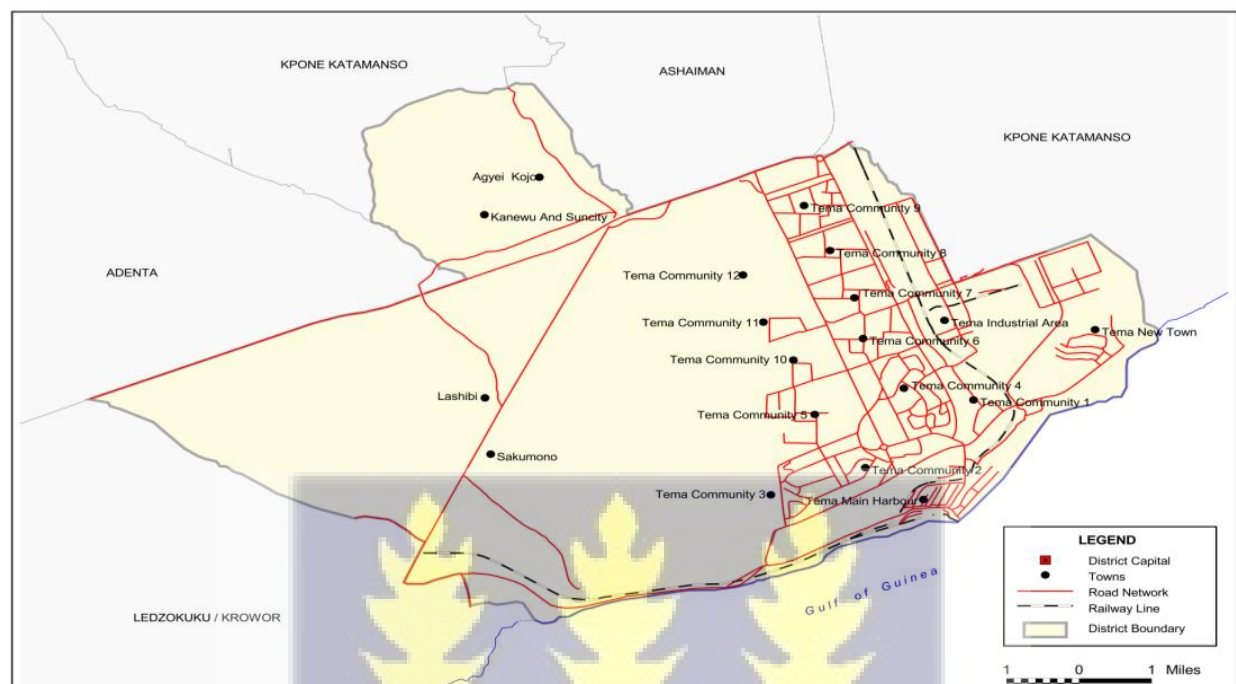
This study was a cross-sectional study with a quantitative approach. conducted at the 1. Data was collected from staff of Tema Development Corporation (TDC) using a socio-demographic questionnaire, the International Physical Activity Questionnaire-Short Form (IPAQ-SF) and Exercise Barriers / Benefits Scale (EBBS). A stratified proportionate sampling method was used to select study participants within the 5 main departments of TDC for this study. Informed consent was sought from participants before involving them in the study.

#### 3.2 Study area

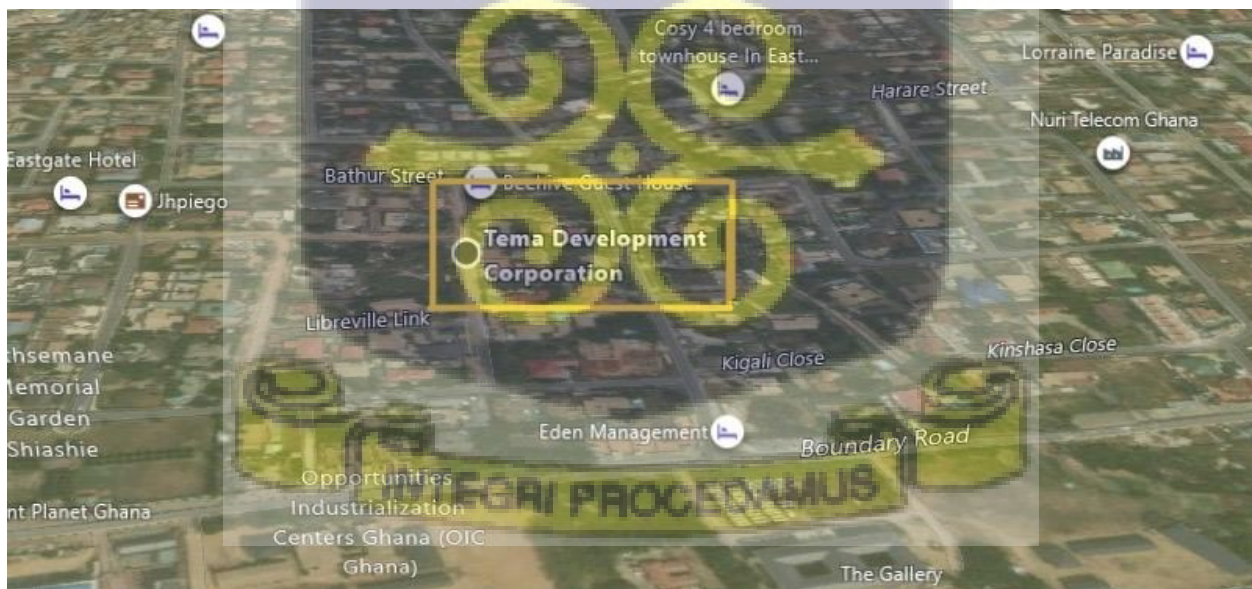
The study area was Tema which is the capital of the Tema Metropolitan District in the Greater Accra Region. Covering an estimated land area of  $50.90km^2$ , it is located approximately 25 kilometres east of Accra which is the capital of the Greater Accra Region. Tema is known for having the Greenwich Meridian passing directly through the city. The population of Tema according to the 2021 Population and Housing Census is 196,224 people who are spread across the 25 communities in the city.

The study site was the Tema Development Corporation located in Tema Community 1 on the Baba Yara Street. TDC is a multidisciplinary institution responsible for the planning, development, and management of publicly-owned land as well as the provision of accommodation in Tema. It employs over 230 professionals including attorneys, administrators, real estate agents, consultants, auditors, architects, and accountants. Majority of the staff of this corporation are involved in long periods of sedentary activity throughout their working days. There are 5 main departments at TDC:

Legal Department, Administration Department, Estates Department, Development Department, and Finance Department.



**Figure 2: Layout of Tema Metropolitan (Source: Ghana Statistical Service Geospatial Intelligence System)**



**Figure 3: Location of Tema Development Corporation in Tema Community 1**

### 3.3 Study population

The study population consisted of all male and female staff in the 5 main departments of Tema Development Corporation who have worked at the institution for 6 or more months.

### 3.4 Study variables

Table 1 outlines the various variables used in the study. It includes the dependent and independent variables of the study.

**Table 1: Description of study variables**

Variables	Classification	Type
<b>Dependent variable:</b>		
Physical activity levels	Dependent (Categorical)	Ordinal
<b>Independent variables:</b>		
Age	Independent (Numerical)	Discrete
Sex	Independent (Categorical)	Nominal
Highest level of education	Independent (Categorical)	Ordinal
Marital status	Independent (Categorical)	Nominal
TDC Department	Independent (Categorical)	Nominal
Hobbies	Independent (Categorical)	Nominal
Barriers to physical activity	Independent (Categorical)	Nominal
Motivators to physical activity	Independent (Categorical)	Nominal



### **3.5 Eligibility criteria**

#### **3.5.1 Inclusion criteria**

The inclusion criteria of the study were;

1. Staff who were present at work during the data collection period.
2. Staff who were not physically impaired.

#### **3.5.2 Exclusion criteria**

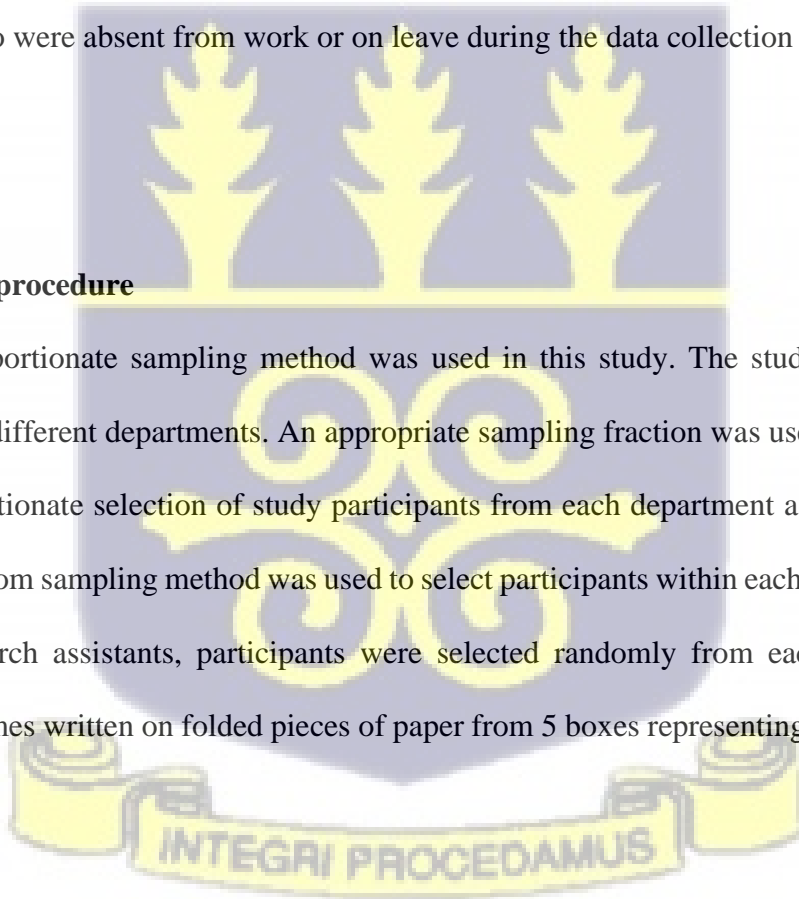
The exclusion criteria of the study are;

1. Staff who had worked at TDC for less than 6 months.
2. Staff who were absent from work or on leave during the data collection period.

### **3.6 Sampling**

#### **3.6.2 Sampling procedure**

A stratified proportionate sampling method was used in this study. The study population was stratified into 5 different departments. An appropriate sampling fraction was used across all strata to ensure proportionate selection of study participants from each department as shown in Figure 2. A simple random sampling method was used to select participants within each department. With the aid of research assistants, participants were selected randomly from each department by picking their names written on folded pieces of paper from 5 boxes representing each department.



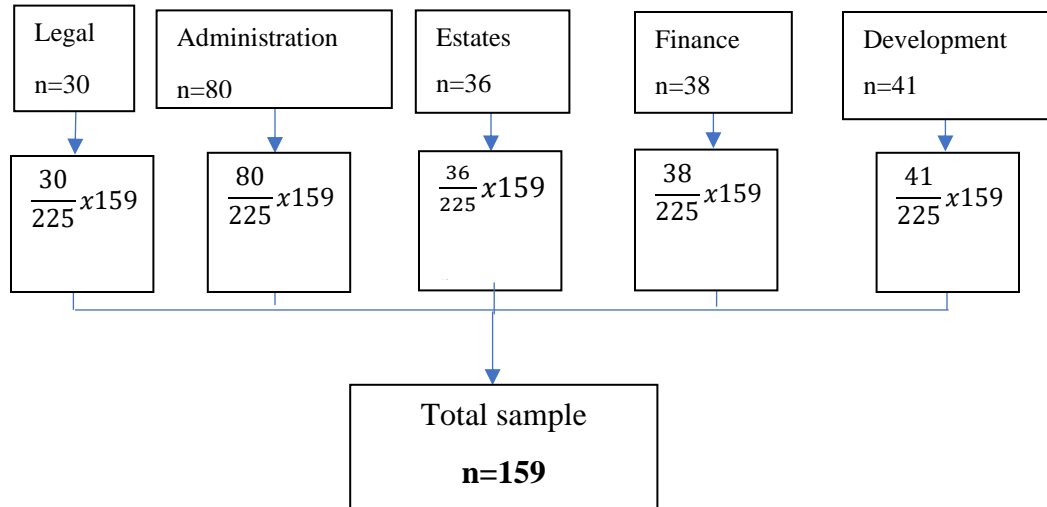


Figure 4: Stratified proportionate sampling procedure at TDC.

### 3.6.1 Estimation of study sample size

The sample size for this study was determined using the Taro Yamane's Formula for sample size calculation at a 95 % confidence level and with an expected non-response rate of 10% (Yamane, 1973).

$$n = \frac{N}{1 + Ne^2}$$

Where n = Sample size

N = Population size

e = Margin of error

For this study,

N = 225 (Source: Estimate provided by an executive of the Human Resource Department of TDC).

At 95% confidence level, e = 0.05

n = **144**

Adding a non-response rate of 10%,

**n= 159**

The total estimated sample size was 159 members of staff of Tema Development Corporation.

**Table 2: Sampling fraction used at TDC**

Department	Number of participants
Administration	$80/225 \times 159 = 57$
Legal	$30/225 \times 159 = 21$
Development	$36/225 \times 159 = 25$
Estates	$38/225 \times 159 = 27$
Finance	$41/225 \times 159 = 29$
<b>Total</b>	<b>159</b>

### 3.7 Data collection tools

A semi-structured questionnaire was designed to collect data on the socio-demographic characteristics of study participants. The International Physical Activity Questionnaire-Short Form (IPAQ-SF) was used to assess the levels of physical activity among the study participants. This tool was a cost-effective method of assessing physical activity levels of individuals within the last 7 days starting from the day the tool was administered to study participants. The tool contained 7 items concerning time spent doing vigorous, moderate and low intensity physical activity during the last 7 days. Items were scored and categorized into vigorous intensity physical activity (a minimum total physical activity of at least 1500 MET- minutes a week), moderate physical activity (a minimum total physical activity of at least 600 MET-minutes a week), and low intensity physical activity (less than 600 MET-minutes per week) (Meh et al., 2021). Data were also collected with regard to the amount of time spent sitting per day with this questionnaire.

The Exercise Barriers / Benefits Scale (EBBS) is a Likert- scale that was used to simultaneously measure physical activity barriers and motivators in this study. The EBBS is a standardized tool

consisting of 43 items - 29 of these investigate perceptions concerning the benefits of physical activity, and 14 of these investigate perceptions concerning barriers to physical activity. The total score after this tool ranged from 43 to 172, with scores for the items on benefits ranging from 29 to 116 and the scores for barriers ranging from 14 to 56 (Farahani et al., 2017).

### **3.8 Quality control**

Research assistants were appropriately trained on how to use the questionnaires and how to explain questionnaire items to study participants before the commencement of this study to ensure that these participants fully understood how to correctly fill the questionnaire forms. Fieldwork was supervised by the Principal Investigator to whom all questions and difficulties were directed. The Principal Investigator was present at the study site during data collection to address any arising issues during this process.

### **3.9 Data processing and analysis**

Data gathered from completed questionnaires were coded, inputted into and processed using Microsoft Excel 2016 and subsequently exported to Epi Info 7.2.5.0 and STATA Version 16 for analysis. The socio-demographic characteristics of the study participants were reported using descriptive statistics. Categorical variables were reported using frequencies and percentages. The median was used to summarize data on age, IPAQ scores and the number of sitting hours instead of the mean as the Shapiro Wilks  $W$  test for normality of data revealed that the data were not normally distributed.

#### **3.9.1 Determination of International Physical Activity Questionnaire composite scores**

This standardized questionnaire contains three questions that asked about the number of days spent performing vigorous, moderate, and low intensity physical activity respectively during the past 7 days from the date the questionnaire was administered to study participants. A fourth question

asked participants to provide an estimation of the amount of time spent sitting daily. For each response provided for the first three questions, the participant was to provide an estimation of the number of minutes spent performing each type of activity during the week. The sum of vigorous weekly activity was a product of the multiplication of the number of days during the week spent performing the activity/ activities, the number of minutes spent doing those activity/ activities, and 8 MET. The sum of moderate weekly activity was a product of the multiplication of the number of days during the week spent performing the activity/ activities, the number of minutes spent doing those activity/ activities, and 4 MET. The sum of low weekly activity was a product of the multiplication of the number of days during the week spent performing the activity/ activities, the number of minutes spent doing those activity/ activities, and 3.3 MET. The composite score of each participant was the sum total of these three values, and participants were then categorized into low, moderate and vigorous physical activity levels using the classification shown in Table 3, with the respective frequencies and percentages being reported across the various socio-demographic variables.

The Pearson chi-square test of independence was used to determine the socio-demographic variables that were significantly associated with physical activity levels. The median number of hours spent sitting per day for TDC staff was also computed using STATA IC 16.

**Table 3: Physical activity level classification**

<b>Physical activity level</b>	<b>MET-minutes per week</b>
Low physical activity level	<600 MET-minutes per week
Moderate physical activity level	600-1499 MET-minutes per week
High physical activity level	1500 + MET-minutes per week

### 3.9.2. Determination of Exercise Benefits/ Barriers Scale composite scores

The analysis of the Exercise Benefits/ Barriers was descriptive using a 4-point Likert scale. The scale used had four points: Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1). Responses for questions concerning exercise barriers were reverse-scored. The questions concerning exercise barriers were questions 4, 6, 9, 12, 14, 16, 19, 21, 24, 28, 33, 37, 40 and 42 respectively. The scores for each domain of the scale were used to describe that domain. The responses were counted and expressed in frequencies, percentages, and charts. Barriers and motivators of physical activity were cross-tabulated with participants' sex.

The composite EBBS score was obtained through the summation of the responses in each domain. The total score was then aggregated and classified into three dimensions: Little Health Benefits, Moderate Health Benefits, and Good Health Benefits with their corresponding ranges of 43-85, 86-128, and 129-172 respectively as shown in Table 4. The ordered logistic regression model was used to test for an association between physical activity levels and EBBS scores.

**Table 4: Categorization of the EBBS scores**

<b>Score Range</b>	<b>EBBS Indicator</b>
43-85	Little Health Benefits
86-128	Moderate Health Benefits
129-172	Good Health Benefits

### 3.10 Ethical considerations

*Ethical clearance:* Ethical clearance was sought from the Ghana Health Service Ethics Review Committee before the commencement of this study, and the study was approved and given the identification number **GHS-ERC: 062/09/22**.

*Permission/Approval from study area:* Permission was also sought from the study site through the submission of a formal request to the Administration of Tema Development Corporation.

*Description of subjects involved:* The study population consisted of male and female members of staff in the 5 main departments of the Tema Development Corporation who had worked at the institution for 6 or more months.

*Potential risks/benefits:* There were no foreseeable risks posed to participants' physical health by this study as the study mainly involved the filling of questionnaires. There may however be a slight possibility of emotional harm as individuals who express low physical activity levels after filling the questionnaires may not feel good about themselves. Study participants were made to understand that the results of this study could be used to produce structured exercise programs that will produce long-lasting physical health benefits at the workplace.

*Privacy/confidentiality:* Explanation of the consenting process and collection of study participants' data was done at each participant's individual work station to promote privacy and minimize interference. Potential participants were given an assurance of utmost confidentiality and the exclusion of their names from the final study results should they agree to be a part of this study.

*Pre-testing of questionnaires:* Questionnaires to be used in this study were pre-tested at Ghana Association of Bankers Health Insurance Company in Accra before this study commenced in order to identify any issues that study participants would face while filling the questionnaires during the actual study. The convenience sampling method was used to select 10 respondents to whom these questionnaires were administered.

*Data storage, security, and usage:* Data recorded from study participants was solely used to fulfill the objectives of this study. Completed questionnaires were safely stored in a locked cabinet to

which only the Principal Investigator had access. These questionnaires were accorded unique codes before data entry into Microsoft Excel. Data entered into the various data processing and analysis software were password-encrypted with only the Principal Investigator possessing knowledge of the password. These data were also safely stored on external storage devices owned solely by the Principal Investigator.

*Description of consenting process:* Potential study participants were approached by the Principal Investigator and research assistants at their office workspaces. A concise description of this study and its objectives was given to potential study participants to help inform their decision to agree to be part of the study. Any potential risks or benefits to participating in this study were clearly spelt out to all potential study participants before seeking their consent.

*Voluntary consent/Withdrawal:* Potential study participants were made to understand that participating in this study was entirely voluntary and that they could at any point decide to freely withdraw from the study.

*Compensation:* There was no material compensation for study participants in this study.

*Protocol Amendment:* The Ghana Health Service Ethics Review Committee will be informed in writing of all amendments made to this study following any changes to the study protocol and the informed consent form, changes with regard to the study site, changes in participant sampling procedures, and any potential challenges faced during the conducting of this study that could affect the safety of participants and/or their willingness to continue participating in this study.

*Declaration of conflict of interest:* The Principal Investigator declared that he had no conflict of interest in this study.

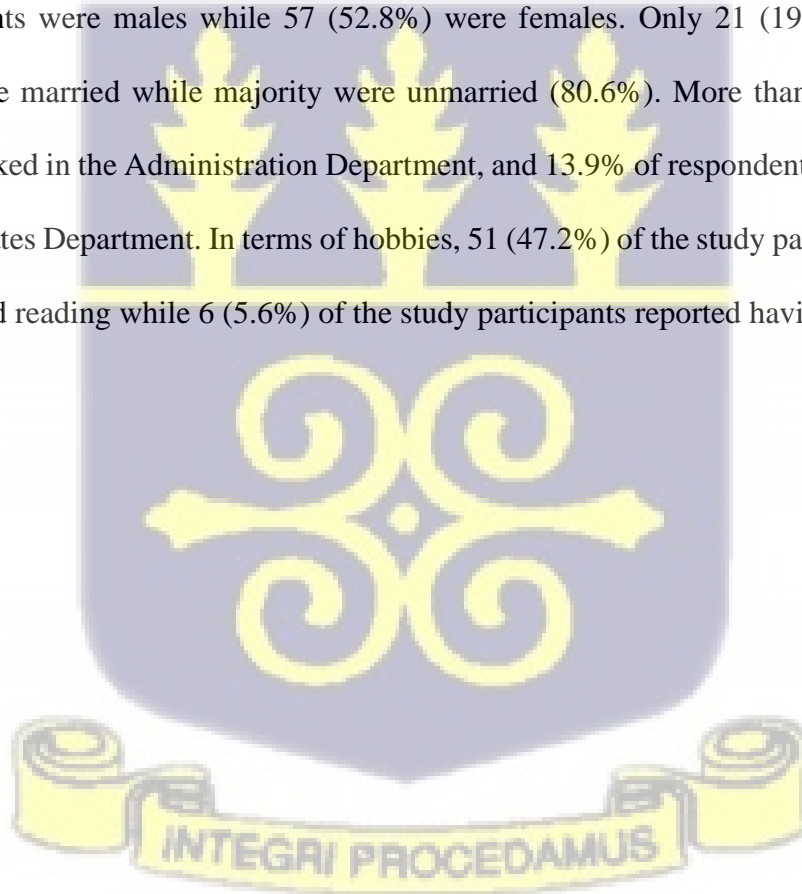
*Protocol funding information:* This study was funded primarily by the Principal Investigator.

## CHAPTER FOUR

### 4.0 RESULTS

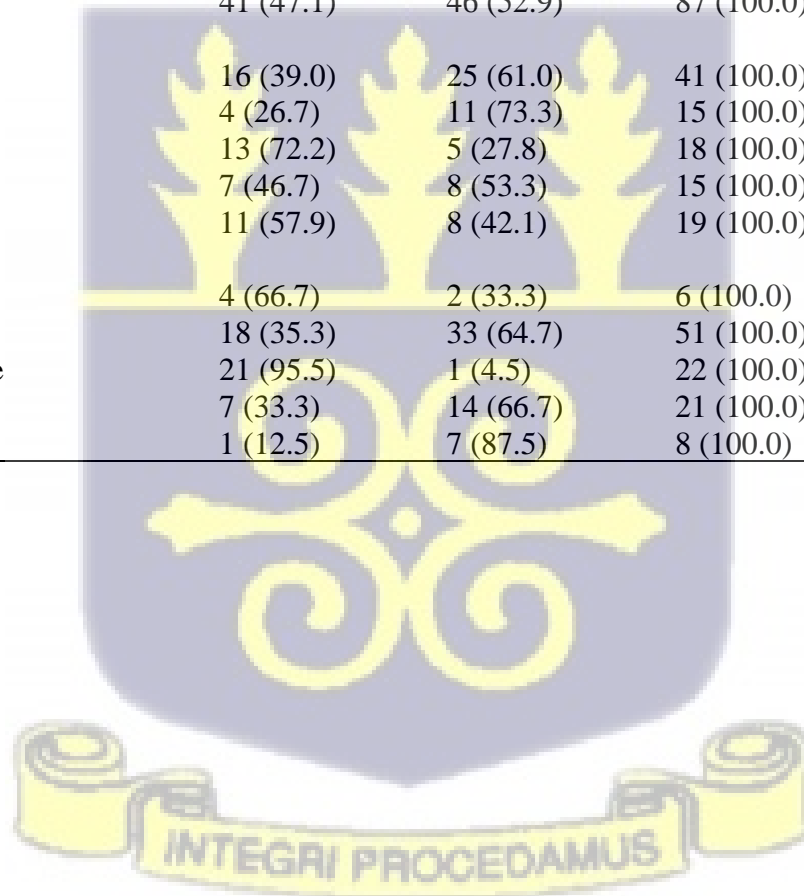
#### 4.1 Socio-demographic characteristics of participants

The socio-demographic characteristics of the study participants are represented in Table 5. This study involved 108 participants between the age range between 19 - 60 years with the median age of 27.5 years. Majority (65%) of the study population was less than 29 years old. Fifty-one (47.2%) of the participants were males while 57 (52.8%) were females. Only 21 (19.4%) of the study participants were married while majority were unmarried (80.6%). More than a third (38%) of participants worked in the Administration Department, and 13.9% of respondents worked in either the Legal or Estates Department. In terms of hobbies, 51 (47.2%) of the study participants reported that they enjoyed reading while 6 (5.6%) of the study participants reported having no hobbies.



**Table 5: Sociodemographic characteristics of participants**

<b>Variables</b>	<b>Male (%) (Median age=30)</b>	<b>Female (%) (Median age=25)</b>	<b>Total (%) (Median age=27.5)</b>
<b>Sex:</b>	51 (47.2)	57 (52.8)	108 (100.0)
<b>Age Group:</b>			
<29	24 (36.9)	41 (63.1)	65 (100.0)
30-39	19 (61.3)	12 (38.7)	31 (100.0)
40-49	7 (70.0)	3 (30.0)	10 (100.0)
50+	1(50.0)	1 (50.0)	2 (100.0)
<b>Highest Educational Level:</b>			
SSS/SHS	1(100)	-	1 (100.0)
Tertiary	50 (46.7)	57 (53.3)	107 (100.0)
<b>Marital Status:</b>			
Married	10 (47.6)	11 (52.4)	21 (100.0)
Not married	41 (47.1)	46 (52.9)	87 (100.0)
<b>Department:</b>			
Administration	16 (39.0)	25 (61.0)	41 (100.0)
Legal	4 (26.7)	11 (73.3)	15 (100.0)
Development	13 (72.2)	5 (27.8)	18 (100.0)
Estates	7 (46.7)	8 (53.3)	15 (100.0)
Finance	11 (57.9)	8 (42.1)	19 (100.0)
<b>Hobbies:</b>			
None	4 (66.7)	2 (33.3)	6 (100.0)
Reading	18 (35.3)	33 (64.7)	51 (100.0)
Sports/Exercise	21 (95.5)	1 (4.5)	22 (100.0)
Traveling	7 (33.3)	14 (66.7)	21 (100.0)
Other	1 (12.5)	7 (87.5)	8 (100.0)



## 4.2 Physical activity levels among TDC staff

### 4.2.1 General physical activity among staff

The IPAQ scoring system for physical activity was used to categorize physical activity levels into three domains as follows: High ( $\geq 1500$  MET-minutes), Moderate (600-1499 MET-minutes), and Low intensity ( $\leq 600$  MET-minutes) physical activity levels (Lee et al., 2011). Out of the 108 participants in this study, 45% (49) were found to have high physical activity levels, 27% (29) expressed moderate physical activity levels, and 28% (30) expressed low physical activity levels as shown in Figure 3. The median MET-minutes for males was recorded as 1828 MET-minutes while that for females was 1002 MET-minutes.

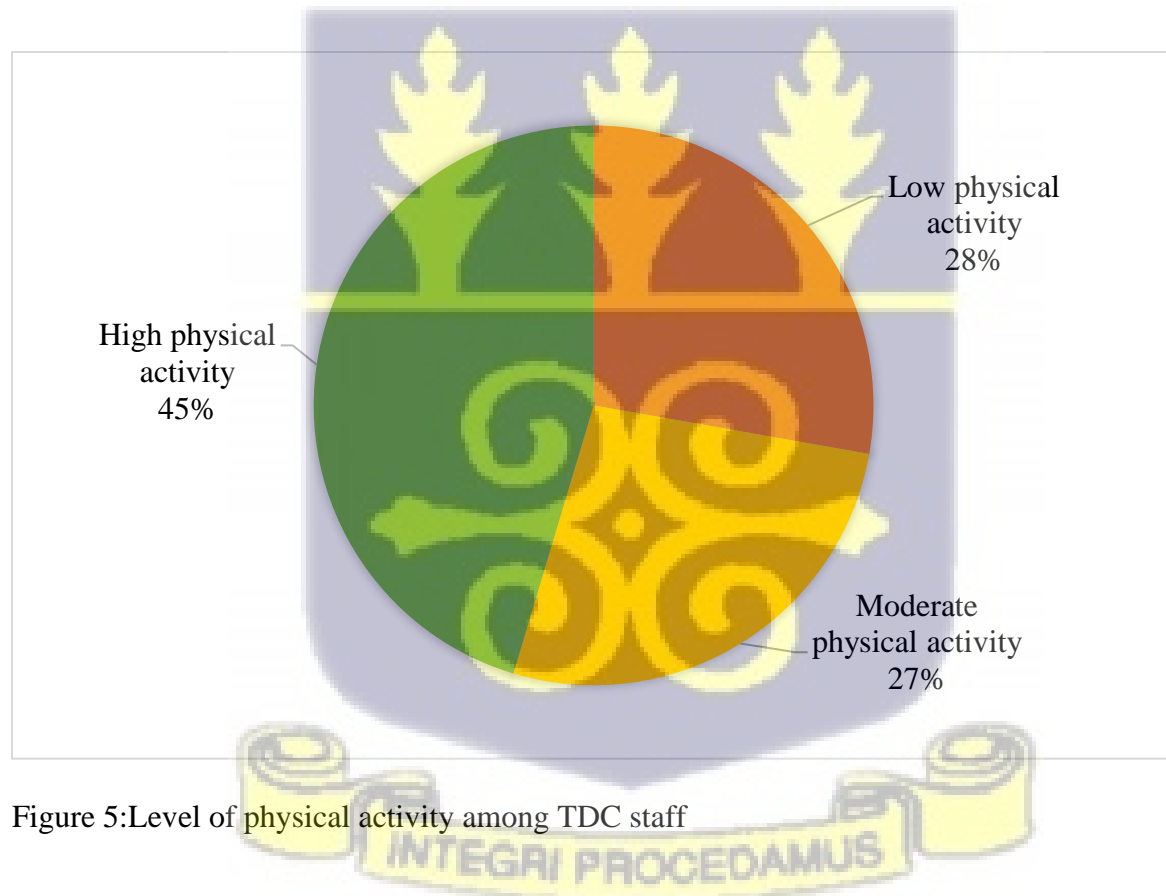


Figure 5: Level of physical activity among TDC staff

#### **4.2.2 Association between the sociodemographic variables and physical activity levels among TDC staff**

Table 6 describes the physical activity levels across the various sociodemographic variables for the TDC members of staff. Both males and females differed significantly in their levels of physical activity. Age was also found to be statistically significant with the study participants less than 29 years old reporting the highest number of high-intensity physical activity levels (32).



**Table 6: Socio-demographic variables associated with physical activity levels**

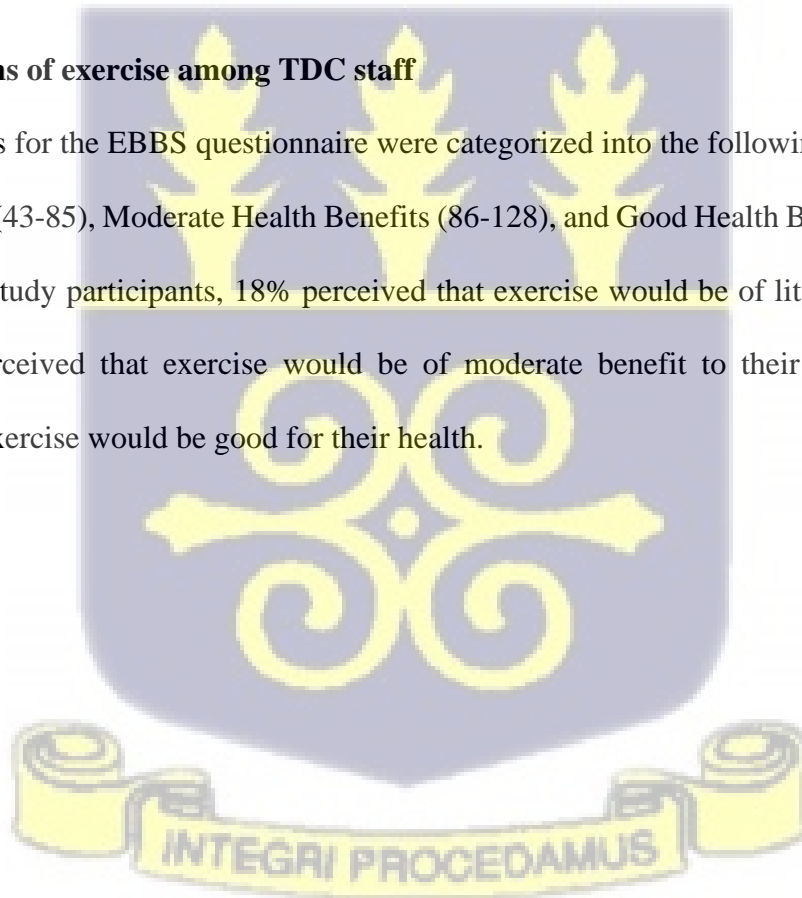
<b>Socio-demographic variables</b>	<b>High-Intensity Levels (n=%)</b>	<b>Moderate-Intensity Levels (n=%)</b>	<b>Low-Intensity Levels (n=%)</b>	<b>Chi-square, (p-value)</b>
<b>Sex</b>				2.36, (0.032)
Males	27 (55.0)	14 (48.3)	10 (33.3)	
Females	22 (45.0)	15 (51.7)	20 (66.7)	
<b>Total</b>	<b>49 (100.0)</b>	<b>29 (100.0)</b>	<b>30 (100.0)</b>	
<b>Age</b>				5.48, (0.044)
<29	32 (65.3)	17 (58.6)	16 (53.3)	
30-39	13 (26.5)	10 (34.5)	8 (26.7)	
40-49	4 (8.2)	1 (3.5)	5 (16.7)	
50+	0 (0)	1 (3.5)	1 (3.3)	
<b>Total</b>	<b>49 (100.0)</b>	<b>29 (100.0)</b>	<b>30 (100.0)</b>	
<b>Marital Status</b>				1.53, (0.465)
Married	7 (14.3)	7 (24.1)	7 (23.3)	
Unmarried	42 (85.7)	22 (75.9)	23 (76.7)	
<b>Total</b>	<b>49 (100.0)</b>	<b>29 (100.0)</b>	<b>30 (100.0)</b>	
<b>Department</b>				8.00, (0.430)
Administration	17 (34.7)	14 (48.3)	10 (33.3)	
Legal	7 (14.3)	1 (3.5)	7 (23.3)	
Development	10 (20.4)	3 (10.3)	5 (16.7)	
Estates	8 (16.3)	4 (13.8)	3 (10.0)	
Finance	7 (14.3)	7 (24.1)	5 (16.7)	
<b>Total</b>	<b>49 (100.0)</b>	<b>29 (100.0)</b>	<b>30 (100.0)</b>	
<b>Hobbies</b>				11.79, (0.160)
None	3 (6.1)	2 (7.0)	1 (3.3)	
Reading	22 (45.0)	13 (44.8)	16 (53.3)	
Sports/ Exercise	14 (28.6)	7 (24.1)	1 (3.3)	
Traveling	9 (18.3)	4 (13.8)	8 (26.7)	
Other	1(2.0)	3 (10.3)	4 (13.4)	
<b>Total</b>	<b>49 (100.0)</b>	<b>29 (100.0)</b>	<b>30 (100.0)</b>	

#### **4.2.8 Average number of hours spent sitting during working hours for TDC staff**

The Shapiro Wilks W test was used to test for normality of data with regards to the number of hours workers spend sitting without physical activity ( $p$ -value = 0.001). Based on failure of the normality test, the median number of sitting hours, and not the mean was calculated and found to be 6 hours/day among workers. Sitting hours ranged from 2-12 hours per day, with some staff reporting sitting hours exceeding 12 hours per day. Staff from the Legal Department reported the highest number of hours spent sitting per day, which was 8 hours. Overall, staff who were older than 50 years were found to spend more than 6 hours sitting at work.

#### **4.3.1 Perceptions of exercise among TDC staff**

Individual scores for the EBBS questionnaire were categorized into the following domains: Little Health Benefits (43-85), Moderate Health Benefits (86-128), and Good Health Benefits (129-172). Out of the 108 study participants, 18% perceived that exercise would be of little benefit to their health, 55% perceived that exercise would be of moderate benefit to their health, and 27% perceived that exercise would be good for their health.



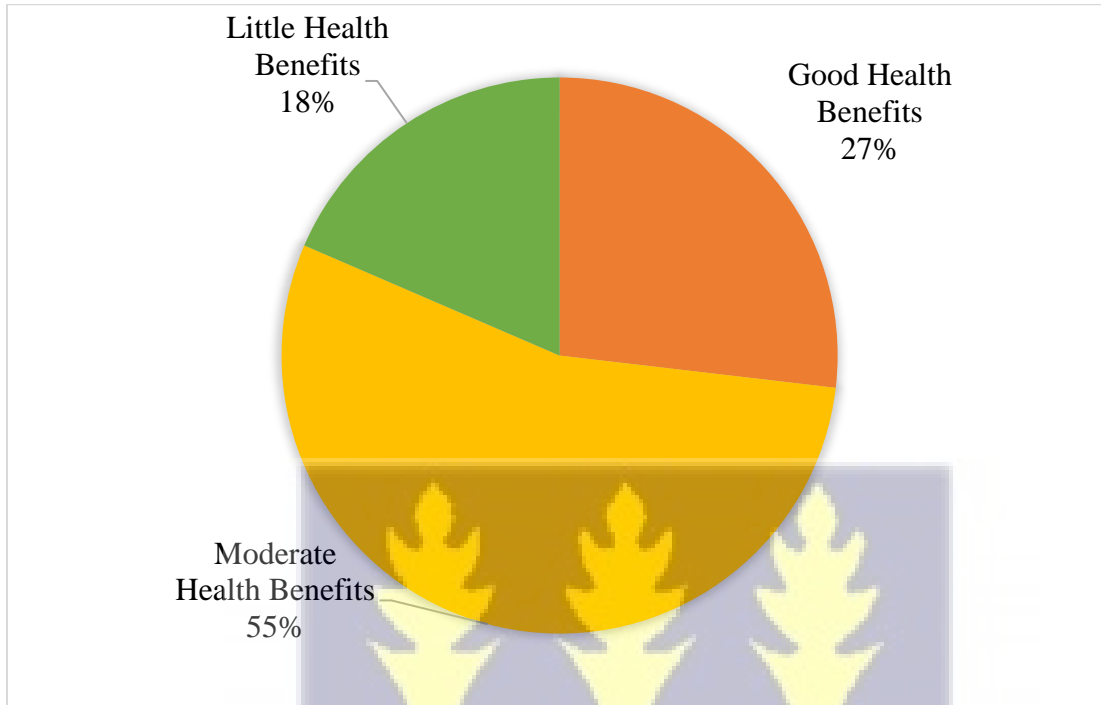


Figure 6: Perception of exercise benefits among TDC staff

#### 4.3.2 Association between physical activity levels and EBBS scores

An ordered logistic regression model run between physical activity levels and EBBS scores revealed there was no significant association between these two variables of interest, with every unit increase in EBBS scores having no significant impact on physical activity levels ( $p=0.304$ ,  $OR=1.005$ ,  $CI = 0.995 \pm 1.017$ ).

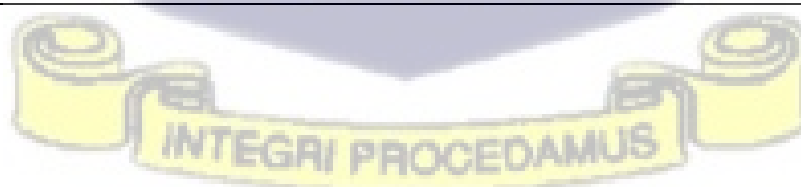


### 4.3.3 Important motivators of physical activity among TDC staff

Table 7 shows that out of the 29 questions on the EBBS concerning exercise benefits that may motivate one to be physically active, the study participants viewed the improvement of physical fitness as the most important motivator for physical activity as reported by 97% of the study population. Other important motivators were the improvement of cardiovascular system functioning, the improvement of stamina, the improvement of muscle strength and the prevention of the development of high blood pressure.

**Table 7: Important physical activity motivators among TDC staff**

Motivators	Agree		Disagree	
	Males (n=%)	Females (n=%)	Males (n=%)	Females (n=%)
Exercising increases my level of physical fitness.	50 (47.6)	55 (52.4)	1 (33.3)	2 (66.7)
Exercising improves the functioning of my cardiovascular system.	45 (45.0)	55 (55.0)	6 (75.0)	2 (25.0)
Exercise increases my stamina.	44 (44.0)	56 (56.0)	7 (87.5)	1 (12.5)
Exercise increases my muscle strength.	43 (44.8)	53 (55.2)	8 (66.7)	4 (33.3)
Exercise will keep me from having high blood pressure.	44 (46.8)	50 (53.2)	7 (50.0)	7 (50.0)



#### 4.3.4 Important barriers to physical activity among TDC staff

The EBBS contains 14 questions on barriers that may inhibit one from being physically active. More than half (53%) of the participants reported that the absence of exercise facilities near their places of residence hindered them from exercising since they were not inclined to travel long distances to use such facilities in other neighbourhoods. Other key barriers reported by the staff were exercise-related fatigue and the difficult nature of exercise.

**Table 8: Important physical activity barriers among TDC staff**

Barriers	Agree		Disagree	
	Males (n=%)	Females (n=%)	Males	Females
There are too few places to exercise.	18 (31.6)	39 (68.4)	38 (74.5)	13 (24.5)
I am fatigued by exercise.	13 (22.8)	44 (77.2)	39 (76.5)	12 (23.5)
Places for me to exercise are too far away.	20 (35.7)	36 (64.3)	39 (75.0)	13 (25.0)
Exercise tires me.	9 (18.6)	39 (81.4)	45 (75.0)	15 (25.0)
Exercise is hard work for me.	13 (27.1)	35 (72.9)	46 (76.7)	14 (23.3)



## CHAPTER FIVE

### 5.0 DISCUSSION

#### 5.1. Summary of the key findings of the study

Results from this study showed that majority of TDC engage in high to moderate physical activity. The quest to achieve physical fitness, strength, and stamina were important motivators for engaging in physical activity, as well as improving the functioning of their cardiovascular system and preventing the development of high blood pressure. Unavailability of physical activity centers near places of residence, long commute to physical activity centers and exercise-related fatigue were found to be important barriers to engaging in physical activity. With regards to all socio-demographic characteristics, only age and sex were found to be significantly associated with physical activity levels, while the males and the youth were found to engage in more physical activity.

#### 5.2. Physical activity levels among TDC staff

##### 5.2.1. Relationship between sex and physical activity levels among TDC staff

The male staff were found to be engaged in higher physical activity levels than their female counterparts; these findings were found to be significant ( $p>0.032$ ). A study by Wanner *et al* (2016) involving 157 males and 189 females in Switzerland using the IPAQ in different languages (German, Italian, and French) revealed that men typically reported higher overall physical activity levels as compared to women with women reporting higher moderate physical activity level averages as compared to that of men. Another similar study conducted in South Africa by Oyeyemi

*et al* (2016) with over 900 rural and urban South African adults revealed that the males were found to have higher overall physical activity levels as compared to that of women. A similar pattern of higher physical activity levels in males has also been identified in studies conducted specifically among office workers (Tek et al., 2020; Ying & Balaraman, 2019). The findings of this study are therefore in line with those of some studies performed internationally on physical activity levels among male and female adults of different socioeconomic characteristics. A possible reason for this occurrence is that males are typically known to be more inclined toward vigorous physical activities such as cycling and running as they believe it could improve body image, fitness, and strength (Ashton et al., 2017). Another study by Edwards and Sackett (2016) reported that women have been proven to have lower perceptions of self-efficacy and typically receive less social support when it comes to physical activity; this can negatively impact their willingness to engage in physical activity.

### **5.2.2. Relationship between age and physical activity levels among TDC staff**

The median age of 27.5 years among respondents/participants indicates that TDC has a significantly young workforce. Majority of the staff who were found to engage in high to moderate physical activity were below the age of 40 years. A study conducted in Poland by Bergier *et al* (2012) to investigate the physical activity levels of the youth in the country concluded after sampling over 7,700 teenagers and over 2,600 university students that these young people were highly physically active, with the median physical activity scores for the males being higher than that for the females. Another study conducted in Poland by Zbrońska & Mędreła-Kuder (2018) with the aim of assessing the physical activity levels of the elderly citizens in the country revealed after sampling 720 citizens (split equally into test and control groups) over the age of 50 revealed that these older citizens mostly engaged themselves in moderate and low physical intensity

activities. Comparing these two studies, the effect of age on physical activity levels becomes more apparent as the younger individuals produced significantly higher physical activity levels than the older individuals. Physiologically, younger individuals are better equipped for high intensity physical activities as they possess more energy and have a faster recovery rate after the performance of these vigorous exercises as compared to older individuals (Tek et al., 2020). Younger individuals may also have more interest in being physically active because they believe it helps to improve their physical appearance (Ashton et al., 2017). Age-related health problems and the fear of injury could also limit older individuals to engaging only in moderate and low-intensity physical activities (Zalewski et al., 2014). A combination of these factors could possibly explain why the younger individuals in this study were found to be more physically active than their older counterparts.

### **5.2.3. Relationship between marital status and physical activity levels among staff of TDC**

The frequency of married study participants was equally distributed among the three physical activity levels. There was a relatively uneven distribution among unmarried study participants, with almost 50% reporting high physical activity levels. The total number of married participants was more than 4 times smaller than that of the unmarried participants. In this study, marital status was not found to be significantly associated with physical activity levels ( $p > 0.465$ ). Similar studies conducted internationally did find a significant association between marital status and physical activity levels. One of these studies was conducted by Basińska-Zych & Kaiser (2017) to investigate the physical activity levels of over 1,500 inhabitants of the Poznań Metropolis in Poland. The study found a significant association between marital status and physical activity levels, with roughly 43% of the 1,014 married participants reporting high physical activity levels and 20% reporting low physical activity levels whereas roughly 61% of the unmarried participants

reported high physical activity levels and 11% reported low physical activity levels. Ibrahim *et al* (2013) concluded in their study that investigated the perceived physical activity barriers in over 300 Malaysian and over 400 Chinese men in relation to their body weight and sociodemographic characteristics that a significant association was found between marriage and physical activity levels (which were assessed using the IPAQ questionnaire). These authors reported that the change in marital status from single to married potentially influenced the 579 married study participants to increase their physical activity levels when compared to the unmarried study participants. In such an instance, it would be important to record the number of years that study participants have been married to know whether physical activity levels increase or reduce gradually with increasing years of marriage.

#### **5.2.4. Physical activity levels of TDC staff by departments**

Concerning TDC departments, the Development Department produced the highest proportion of study participants with high physical activity levels while the Legal Department produced the highest proportion of study participants with low physical activity levels. A possible explanation for the relatively high number of high physical activity level cases from the Development Department could be the more physically active nature of work. Some of the major roles for the staff of this department as described in the TDC Annual Report for 2021 are the surveying of state lands and the demarcation of appropriate plot dimensions in accordance with site plans drawn by TDC architects and land surveyors. In contrast, most of the activities in the Legal Department involved a lot of sedentary activities such as reading through paperwork, the official documentation of company activities and reviewing old and current court case files for pertinent information. Such activities encourage lower physical activity levels and increased daily sitting time.

### **5.2.5 Relationship between hobbies and physical activity levels among staff of TDC**

Study participants that enjoyed sports/ exercising as their hobbies produced the highest number of high physical activity level cases and the lowest number of low physical activity level cases among all the hobbies. Hobbies that produced the highest number of low physical activity level cases were reading and traveling. Hobbies were proven to have no significant association with physical activity levels in this study ( $p > 0.160$ ). Hsueh, Liao & Chang (2016) concluded after carrying out an epidemiological study to investigate any possible associations between Type II diabetes and low physical activity levels among 1,046 elderly Taiwanese citizens (all over 64 years old) that no significant association was found between hobbies and physical activity levels or between hobbies and the risk of developing Type II diabetes respectively. Participants in this particular study spent less than 10 minutes per day on average enjoying their hobbies which were not specified. Ullrich *et al* (2018) also reported in their study that assessed the impact that leisure-time sedentary behaviours could have on clustered cardiometabolic health risks in 173 study participants that there was no significant association between reading and physical activity levels as well as cardiometabolic risk scores. It however found a significant association between watching television for several hours regularly and cardiometabolic risk scores. A similar study by Altenburg *et al* (2014) on cardiometabolic risk factors also found no significant association between the hobbies reported by study participants and physical activity levels.

### **5.2.6. Hours spent sitting among TDC staff**

The number of hours spent sitting at work may vary among different workplaces depending on what kind of work is carried out at these workplaces. The reported number of hours that the TDC study participants spent sitting at work on a daily basis could be harmful to their physical health as sitting for long periods of time has been associated with low physical activity levels and the

development of various musculoskeletal and noncommunicable diseases. (Addo et al., 2015; Veer et al., 2018). Danquah *et al* (2017) concluded after conducting a study to assess the sitting time of over 300 sedentary workers from 19 different offices that the workers spent approximately 4 hours sitting at work during an 8-hour working shift, with majority of these workers experiencing some forms of musculoskeletal disorders. Clemes *et al* (2014) also reported that on average, the 72 participants in their study spent roughly 8-and-a-half hours sitting at work, and this was potentially harmful to their health. Comparing the median number of hours spent sitting at work by TDC staff to the results of the aforementioned studies, these individuals could possibly be at risk of the gradual development of some musculoskeletal and noncommunicable diseases. This phenomenon could be considered as the most prominent work-related factor affecting physical activity levels and consequently, the physical health of TDC members of staff.

### **5.3. Perception of benefits of exercise among TDC staff**

Twenty-seven percent of the 108 study participants expressed a positive perception of exercise, indicating that they believed they would derive good health benefits from exercise. About 18% expressed a negative perception of exercise, indicating that they believed that exercise would produce little benefits to their health. The high level of education of the TDC study participants could possibly mean that they are well-informed on issues relating to physical health and the benefits of exercise; this could positively influence their perception of exercise. Despite the relatively positive perception of exercise of TDC staff, no significant association was found between physical activity levels and individual EBBS scores in this study ( $p=0.304$ ). This finding seems to differ from the findings of other similarly conducted studies. Kamrani *et al* (2014) concluded after assessing the perceptions of exercise in 388 study subjects using the EBBS that there was a positive correlation between physical activity and EBBS scores ( $p=0.005$ ). Studies by

Farahani *et al* (2017) and Kgekong & Parker (2020) also found positive correlations between physical activity levels and EBBS scores, indicating that people who reported high and moderate physical activity levels were also likely to report that they found exercise to be beneficial to their health.

#### **5.4. Important motivators to physical activity among staff of TDC**

The participants in this study appear to desire improvements in their physical health as they rated physical attributes such as physical fitness, stamina, and muscle strength as their biggest motivators to being physically active. Bakinde (2022) reported in his study that assessed the perceived benefits of exercise among 112 Nigerian civil servants that the study participants perceived an improvement in cardiovascular health as the most important benefit of exercising. They also rated improved muscular endurance and flexibility as important health benefits of exercising. In a study conducted by van Uffelen *et al* (2017) to assess the gender differences in physical activity motivators in over 1840 study participants, it was reported that both men and women were mostly motivated to exercise because it would help prevent health problems and make them lose weight. The study also discovered that the female study participants had a stronger likelihood to rate exercise benefits such as improved physical appearance and meeting new friends more highly than other exercise benefits. They also had a lower likelihood of performing exercises that were competitive or vigorous as compared to the males.

Roughly 88% of the male TDC study participants believed that exercise would improve their physical fitness. This belief corresponds with the fact that 95% of the study participants who enjoyed sports or exercise as a hobby were males. Through these activities, they could also reap physical health benefits such as increased stamina and muscle strength. Attributes like these are

especially important for office workers as they can experience a significant gradual decline in physical health in workplaces that demand low physical energy expenditure throughout the week.

Although 96 % of the female TDC study participants also believed that exercise would improve their physical fitness, 67% of the participants that reported low physical activity levels were females. This suggests that their positive perception of exercise did not necessarily influence their physical activity behaviours. Eighty-eight percent of the female participants believed that exercise would help prevent the development of hypertension; this is especially important as hypertension is reported to be one of the major risk factors for the development of some NCDS, with women reportedly being more at risk of the development of hypertension than men (Nyirenda, 2016; WHO, 2021; WHO, 2018) .

### **5.5. Important barriers to physical activity among staff of TDC**

The study participants of TDC seemed to be of the perception that the main way to be physically active was to frequently visit exercise centres such as gymnasiums as suggested by the fact that they reported the lack of exercise centres in their residential areas was the main barrier to being physically active. Distance from exercise centres was one of the most prominent barriers identified in previously conducted studies in Africa (Aro et al., 2010 & Shehu et al., 2013). A study conducted in Nigeria among 400 diabetic and non-diabetic adults by Ikechukwu *et al* (2021) concluded that the expensive cost of exercising, the excessive distance of exercise centres from their places of residence, and a feeling of embarrassment were rated as the most important barriers to exercise for study participants of both sexes. Some other physical activity barriers identified from qualitative studies include the lack of knowledge about the physical health benefits of exercise, lack of motivation from peers, and having some disease conditions (Webb et al., 2022; Yarmohammadi et al., 2017).

Approximately 39 % of the male TDC study participants viewed the excessive distance between their places of exercise and their residential areas as a major barrier to being physically active. Very little can be done to reduce distances between exercise centres and permanent places of residence. Through some physical health education, however, people can be made to understand that exercise does not have to be entirely dependent on proximity to exercise centres but can actually be performed on a regular basis in the home environment. For this to be successful, the exercises must be structured in such a way that they are not time-consuming and do not interfere with daily activities and responsibilities. If possible, the exercises must involve close family members, spouses, and/or partners so that a collective spirit of encouragement to continue exercising can be generated in the household. Physiotherapists are instrumental in educating individuals on physical health and structuring home exercise programs that are sustainable over a period of time.

The most prominent physical activity barrier for the female study participants was exercise-related fatigue with about 77% of these females reporting this phenomenon as a major hindrance for them. Though highly beneficial to health, exercise could become very tiring if it is not well-structured and specifically tailored to every individual according to his or her physical capabilities and other pertinent demographic characteristics such as age. Ideally, exercise must be planned, structured, and repetitive. A common principle used mostly by physiotherapists in structuring exercise programs for clients is the FITT principle which stipulates that every exercise must have a specific frequency, intensity, type, and duration (Adi, 2021). This principle also requires that exercise must be individualized for every person taking into consideration every individual's physical capability, age, health goals, and weekly schedules. It is therefore important to educate oneself on the various

types and benefits of exercise by reading and to seek the counsel of health professionals prior to the adoption of any exercise regime.



## CHAPTER SIX

### 6.0 CONCLUSION AND RECOMMENDATIONS

#### 6.1 Conclusion

- Majority (72%) of the study participants were found to have high and moderate physical activity levels.
- Study participants were motivated to exercise because they believed exercise would improve their physical fitness, strength, stamina, and cardiovascular health. The main factors reported as barriers to exercise were the unavailability of physical activity centers near places of residence, the long commute to physical activity centers, exercise-related fatigue, and the difficult nature of exercises. Out of all the recorded socio-demographic characteristics, only age and sex were found to be significantly associated with physical activity levels.

#### 6.2 Recommendations

The following recommendations have been made:

##### **Public health recommendations:**

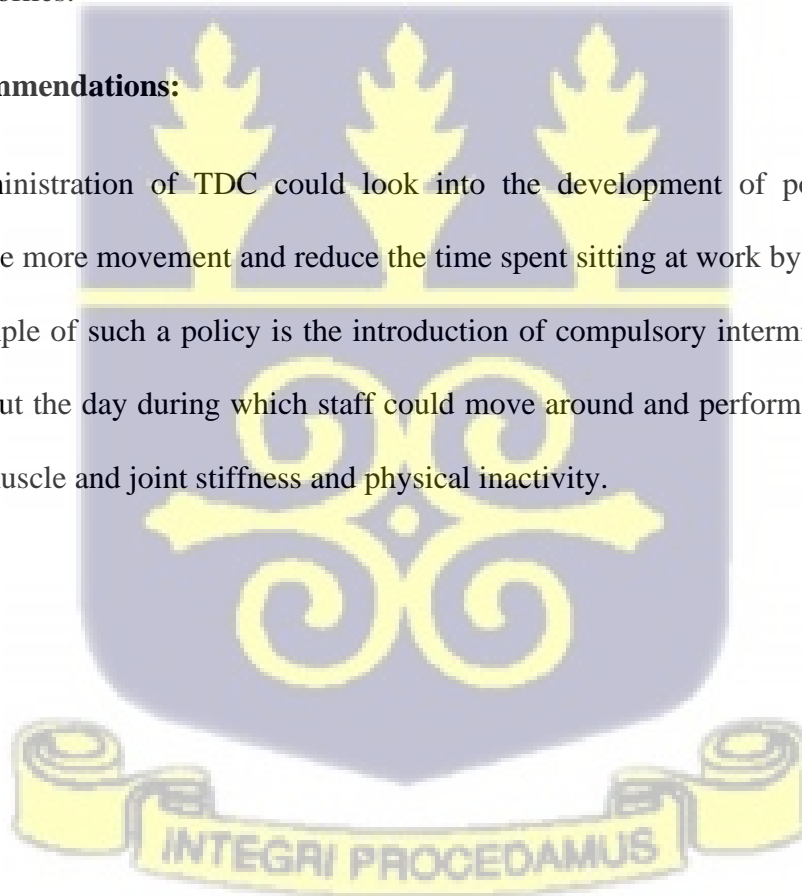
- TDC should engage the services of physiotherapists periodically to teach staff members some stretch and exercise routines that can be done at work at regular intervals to reduce time spent sitting at work.

**Research recommendations:**

- Further studies of a similar nature should be carried out on a larger scale taking into consideration the places of residence of study participants to be able to assess the relationship between places of residence and physical activity levels as this relationship was not assessed in this study. These other studies could also incorporate the measurement of study participants' blood pressure and body mass index so that the relationship between these measurements and the study participants' reported physical activity levels could be assessed. These measurements will provide a better picture of the participants' physical health profiles.

**Policy recommendations:**

- The administration of TDC could look into the development of policies that could encourage more movement and reduce the time spent sitting at work by members of staff. An example of such a policy is the introduction of compulsory intermittent short breaks throughout the day during which staff could move around and perform some stretches to reduce muscle and joint stiffness and physical inactivity.



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## 7.0 APPENDICES

### Appendix 1: Participant information sheet and informed consent form

#### PARTICIPANT INFORMATION SHEET

**Dissertation Title:** The Assessment of Physical Activity Levels, Barriers and Motivators to Physical Activity among Tema Development Corporation Staff

**Institution of Affiliation:** School of Public Health, University of Ghana, Legon.

**Background of Interviewer:** I, **Kojo Aikins**, am a postgraduate student from the School of Public Health of the University of Ghana who is here to collect data about the barriers and motivators to physical activity among Tema Development Corporation staff. The data collected from you will help me identify the things that facilitate indulgence in regular physical activity and things that limit participation in regular physical activity among Tema Development Corporation staff. A copy of the final outcome of this study will be submitted to the administration of this institution to keep all members of staff updated on this study's findings. Please respond to the questions as sincerely as you can and to the best of your knowledge.

**Procedure:** Data about your background characteristics will first be collected using a simple data collection form. A simple structured questionnaire will then be used to gather data about your physical activity levels within the past 7 days. Another semi-structured questionnaire will be used to gather data about things that motivate or prevent you from being physically active. These data collection forms are concise and should take less than 10 minutes of your time to complete.

**Risks involved in participating in this study:** There are no foreseeable risks to your health and well-being should you decide to take part in this study. The Principal Investigator and his research assistants will approach you in face masks and with their hands sanitized to ensure the full observance of COVID-19 public health protocols.

**Freedom to Withdraw:** You are free at any time to withdraw from the study and will not be questioned for doing so.

**Anonymity and Confidentiality:** Your name will be excluded from the findings of this study to ensure absolute anonymity and confidentiality. Data gathered from any study participant will be stored in a secure database to which only the Principal Investigator will have access.

**Contact details of the principal investigator:** In case of any difficulty or if there is a need for extra clarification, you can contact me on the phone numbers **0272073841/0269172257** or the E-mail address [edukaikins@gmail.com](mailto:edukaikins@gmail.com). For further clarification on ethical issues please contact Madam Nana Abena Apatu, the administrator at the Ghana Health Service Ethics Review Committee on the telephone number **0503539896** or with the E-mail address [ethics.research@ghsmail.org](mailto:ethics.research@ghsmail.org).



**INFORMED CONSENT FORM**

STUDY TITLE: The Assessment of Physical Activity Levels, Barriers and Motivators to Physical Activity among Tema Development Corporation Staff

PARTICIPANTS' STATEMENT

I acknowledge that I have read or have had the purpose and contents of the Participants' Information Sheet read and all questions satisfactorily explained to me in a language I understand (English). I fully understand the contents and any potential implications as well as my right to change my mind (i.e., withdraw from the research) even after I have signed this form.

I voluntarily agree to be part of this research.

Name of Participant.....

Participants' Signature .....OR Thumb Print.....

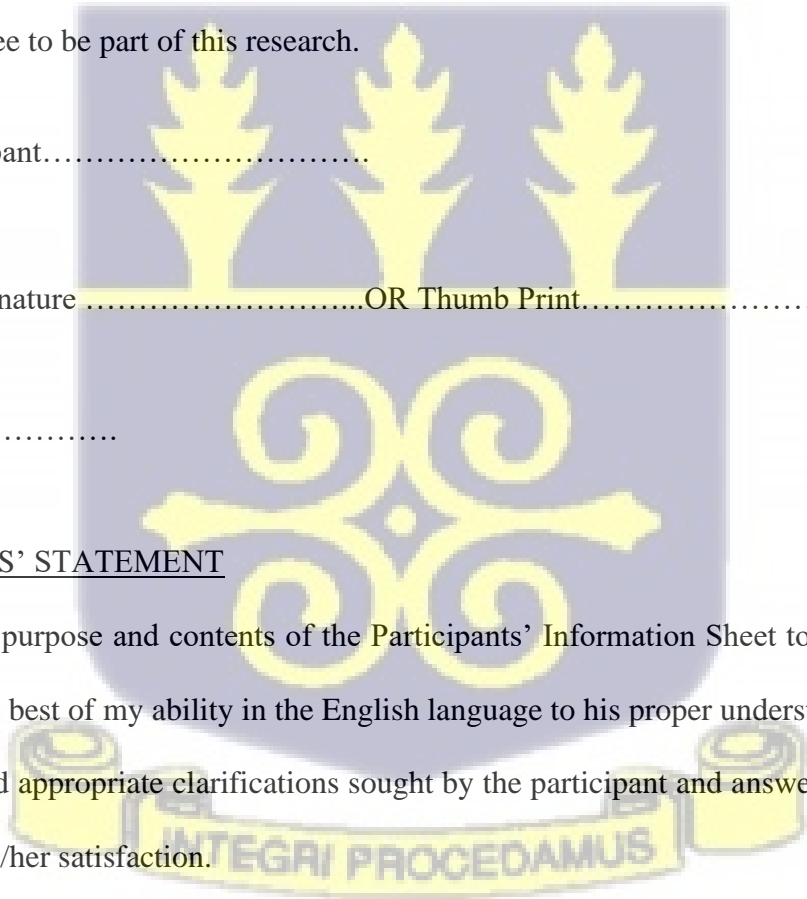
Date:.....

INTERPRETERS' STATEMENT

I interpreted the purpose and contents of the Participants' Information Sheet to the afore named participant to the best of my ability in the English language to his proper understanding.

All questions and appropriate clarifications sought by the participant and answers were also duly interpreted to his/her satisfaction.

Name of Interpreter..... Date:.....



Signature of Interpreter..... OR Thumb Print .....

Contact Details:

STATEMENT OF WITNESS

I was present when the purpose and contents of the Participant Information Sheet was read and explained satisfactorily to the participant in the language he/she understood (English).

I confirm that he/she was given the opportunity to ask questions/seek clarifications and same were duly answered to his/her satisfaction before voluntarily agreeing to be part of the research.

Name:.....

Signature:..... OR Thumb Print .....

Date:.....

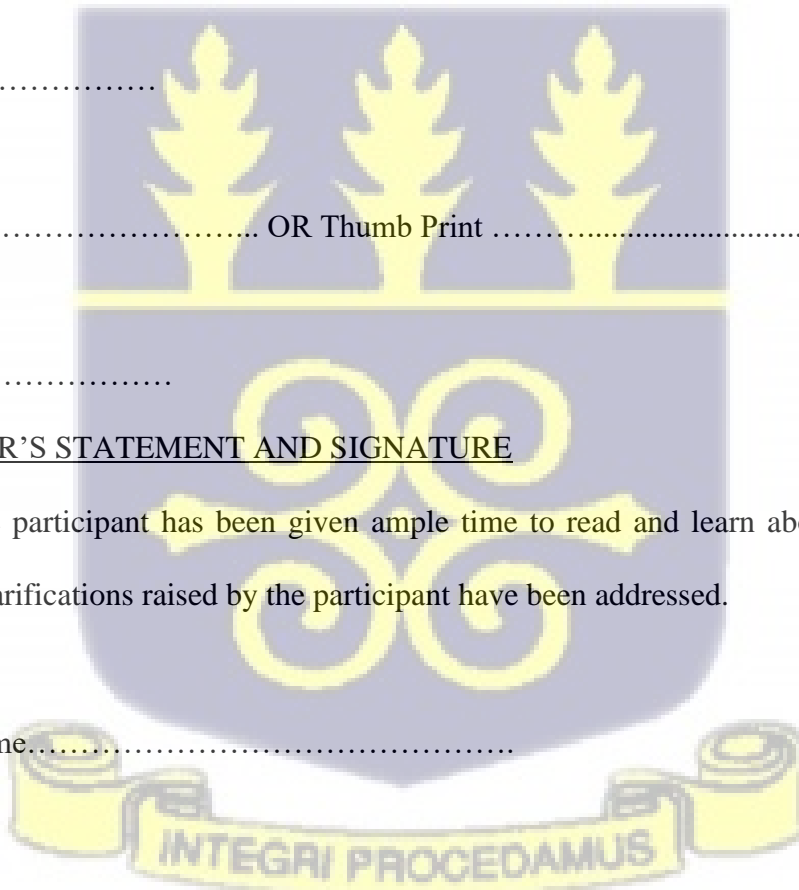
INVESTIGATOR'S STATEMENT AND SIGNATURE

I certify that the participant has been given ample time to read and learn about the study. All questions and clarifications raised by the participant have been addressed.

Researcher's name.....

Signature .....

Date.....



**Appendix 2: Questionnaire for sociodemographic data**

Please answer each question as accurately as possible by writing the number that corresponds to your answer in the box in the response column on the right.

QN NO.	QUESTION	RESPONSE
Participant's ID:  __   __   __		
<b>SECTION A</b>	<b>SOCIO-DEMOGRAPHIC DATA</b>	
1	What is your sex? 1. Male 2. Female	__
2	What is your age in years (i.e., age at last birthday)?	__   __  years
3	What is the highest level of school you attended? 1. No education 2. Primary 3. Middle/JSS/JHS 4. SSS/SHS/Secondary/Vocational/Technical 5. Tertiary	__
4	What is your current marital status? 1. Married 2. Not married	__
5	Which department in TDC are you in? 1. Administration 2. Legal 3. Development 4. Estates 5. Finance	__
6.	What is /are your hobbies (if any)? 1. None 2. Reading 3. Sports/exercise(Please specify _____) 4. Traveling 5. Other (Please specify _____)	<input type="text"/>

**Appendix 3: International Physical Activity Questionnaire - Short Form**

**SECTION 2: INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE**

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

7. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

\_\_\_\_\_ **days per week**

No vigorous physical activities  **Skip to question 9**

8. How much time did you usually spend doing **vigorous** physical activities on one of those days?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

Don't know/Not sure


Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe

somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

9. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis?

Do not include walking.

\_\_\_\_\_ **days per week**

No moderate physical activities  *Skip to question 11*

10. How much time did you usually spend doing **moderate** physical activities on one of those days?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

11. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

\_\_\_\_\_ **days per week**

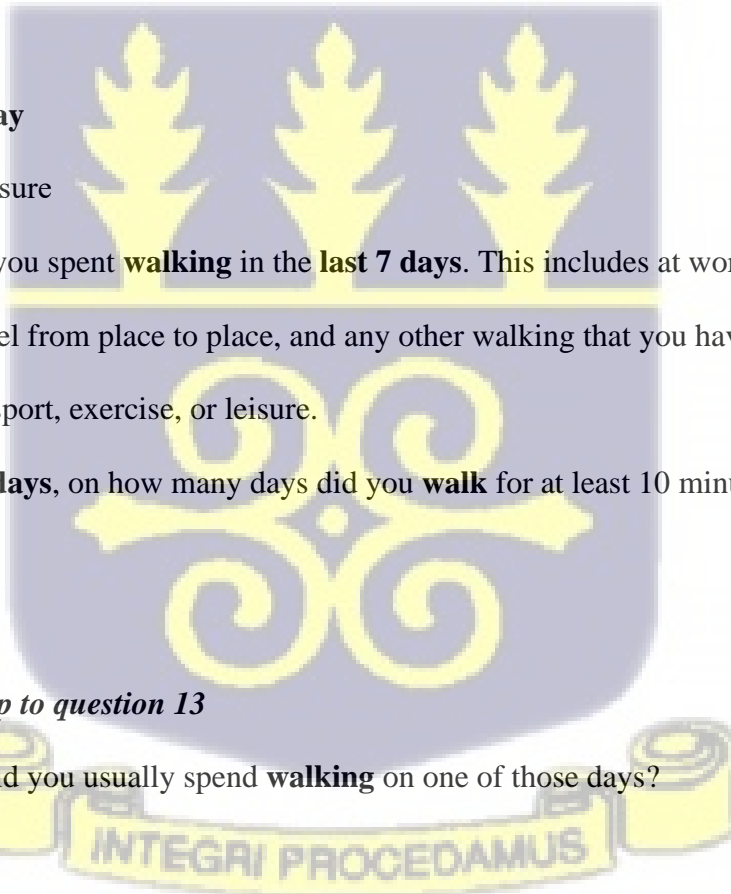
No walking  *Skip to question 13*

12. How much time did you usually spend **walking** on one of those days?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**

Don't know/Not sure



The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

13. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

\_\_\_\_\_ **hours per day**

\_\_\_\_\_ **minutes per day**



**Appendix 4: The Exercise Benefits/ Barriers Scale**

**SECTION 3: THE EXERCISE BENEFITS/BARRIERS SCALE**

DIRECTIONS: Below are statements that relate to ideas about exercise. Please indicate the degree to which you agree or disagree with the statements by circling **SA** under **column 4** for **Strongly Agree**, **A** under **column 3** for **Agree**, **D** under **column 2** for **Disagree**, or **SD** under **column 1** for **Strongly Disagree**.

QN NO.	QUESTION	4	3	2	1
14.	I enjoy exercise.	SA	A	D	SD
15.	Exercise decreases feelings of stress and tension for me.	SA	A	D	SD
16.	Exercise improves my mental health.	SA	A	D	SD
17.	Exercising takes too much of my time.	SA	A	D	SD
18.	I will prevent heart attacks by exercising.	SA	A	D	SD
19.	Exercise tires me.	SA	A	D	SD
20.	Exercise increases my muscle strength.	SA	A	D	SD
21.	Exercise gives me a sense of personal accomplishment.	SA	A	D	SD
22.	Places for me to exercise are too far away.	SA	A	D	SD
23.	Exercising makes me feel relaxed.	SA	A	D	SD
24.	Exercising lets me have contact with friends and persons I enjoy.	SA	A	D	SD
25.	I am too embarrassed to exercise.	SA	A	D	SD
26.	Exercising will keep me from having high blood pressure.	SA	A	D	SD
27.	It costs too much to exercise.	SA	A	D	SD
28.	Exercising increases my level of physical fitness.	SA	A	D	SD

29.	Exercise facilities do not have convenient schedules for me.	SA	A	D	SD
30.	My muscle tone is improved with exercise.	SA	A	D	SD
31.	Exercising improves functioning of my cardiovascular system.	SA	A	D	SD
32.	I am fatigued by exercise.	SA	A	D	SD
33.	I have improved feelings of well-being from exercise.	SA	A	D	SD
34.	My spouse (or significant other) does not encourage exercising.	SA	A	D	SD
35.	Exercise increases my stamina.	SA	A	D	SD
36.	Exercise improves my flexibility.	SA	A	D	SD
37.	Exercise takes too much time from family relationships.	SA	A	D	SD
38.	My disposition is improved with exercise.	SA	A	D	SD
39.	Exercising helps me sleep better at night.	SA	A	D	SD
40.	I will live longer if I exercise.	SA	A	D	SD
41.	I think people in exercise clothes look funny.	SA	A	D	SD
42.	Exercise helps me decrease fatigue.	SA	A	D	SD
43.	Exercising is a good way for me to meet new people.	SA	A	D	SD
44.	My physical endurance is improved by exercising.	SA	A	D	SD
45.	Exercising improves my self-concept.	SA	A	D	SD
46.	My family members do not encourage me to exercise.	SA	A	D	SD
47.	Exercising increases my mental alertness.	SA	A	D	SD
48.	Exercise allows me to carry out normal activities without becoming tired.	SA	A	D	SD
49.	Exercise improves the quality of my work.	SA	A	D	SD
50.	Exercise takes too much time from my family responsibilities.	SA	A	D	SD

51.	Exercise is good entertainment for me.	SA	A	D	SD
52.	Exercising increases my acceptance by others.	SA	A	D	SD
53.	Exercise is hard work for me.	SA	A	D	SD
54.	Exercise improves overall body functioning for me.	SA	A	D	SD
55.	There are too few places for me to exercise.	SA	A	D	SD
56.	Exercise improves the way my body looks.	SA	A	D	SD



**Appendix 5: Ghana Health Service Ethics Review Committee Approval Letter**

**GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE**

*In case of reply the number and date of this Letter should be quoted.*



Research & Development Division  
Ghana Health Service  
P. O. Box MB 190  
Accra  
Digital Address: GA-050-3303  
Mob: +233-50-3539896  
Tel: +233-302-681109  
Email: [ethics.research@ghsmai.org](mailto:ethics.research@ghsmai.org)  
26<sup>th</sup> September, 2022

My Ref. GHS/RDD/ERC/Admin/App 102/124  
Your Ref. No.

Kojo Edumadze Aikins  
P. O. Box O.S 1900, Osu, Accra.

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	<b>GHS-ERC: 062/09/22</b>
Study Title	The Assessment of Physical Activity Levels, Barriers and Motivators to Physical Activity among Staff of Tema Development Corporation
Approval Date	26 <sup>th</sup> September, 2022
Expiry Date	25 <sup>th</sup> September, 2023
GHS-ERC Decision	<b>Approved</b>

**This approval requires the following from the Principal Investigator**

- Submission of a yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months.
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

**You are kindly advised to adhere to the national guidelines or protocols on the prevention of COVID -19**

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....  
Mr. Kofi Wellington  
(GHS ERC Vice Chairperson)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra

