

**Assessing The Impact Of Ergonomic Situations On The Wellbeing Of
Teachers In Basic Public And Private Schools Of The Awutu Senya
East Municipal Of The Central Region Of Ghana.**

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DECLARATION

I Nana Yaa Afrah Amoakohene, declare that this thesis ASSESSING THE IMPACT OF ERGONOMIC SITUATIONS ON THE WELLBEING OF TEACHERS IN BASIC PUBLIC AND PRIVATE SCHOOLS OF THE AWUTU SENYA EAST MUNICIPAL OF THE CENTRAL REGION OF GHANA presented this original work carried out by me under the supervision of Prof. Dr. Ing. habil Andre Klussmann and Dr. Victor Mogre .I confirm that this research work was carried out while I was still a master student at the Hamburg University of Applied Sciences. In this research work, I accessed past published research work of others and used all the sources appropriately.

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DEDICATION

I dedicate this research work to the ALMIGHTY GOD, the giver of all wisdom, knowledge and understanding and to my parents, Mr. Paul Adu Amoakohene and Mrs. Patricia Amoakohene for their encouragement.

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LIST OF ABBREVIATION

Abbreviation	Meaning/ Phrases
CRIOP	Culturally Responsive Instruction Observation Protocol
EPA	Environmental Protection Agency
GNAT	Ghana National Association of Teachers
IEA	International Ergonomics Association
ILO	International Labour Organisation
MSD	Musculoskeletal Disorders
OSHA	Occupational Health and Safety Association
VS	Versus
WHO	World Health Organisation
WSMD	Work related Musculoskeletal Disorder

ABSTRACT

The ergonomic situations of the workplace directly and or indirectly impact on the emotional and physical wellbeing of the worker as working continuously with the wrong body posture can affect the musculoskeletal system of the body. The concept of ergonomics is basically to ensure the creation of enabling working environment that ensures the safety and comfort of employees.

This study was aimed at assessing the impact of ergonomic situations on the wellbeing of Teachers in basic public and private schools of the Awutu Senya East Municipal of the Central Region of Ghana. This study therefore seeks to assess the ergonomics and occupational health situations among private and public schools in Ghana.

The cross-sectional study, the descriptive survey and a case study approach was applied in this study. A set of Standard Nordic Questionnaire was adopted as the tool for data collection and the gathered data was analyzed using SPSS and Microsoft Excel Pivot table charts. The data analysis was done by the use of mean response ratings and correlation analysis. A total of 140 purposively selected respondents were invited by email with a link to the online questionnaire to participate in answering the question of the questionnaire of this study. As the process of the data collection was purposively driven, 112 out of the 140 invited respondents participated in answering the questions, for a response rate of 80 percent.

The study brought to light that there is indeed a positive correlation between ergonomic situations on the wellbeing of teachers in both public and private basic schools in Ghana, although the degree of the relation is higher at the public basic schools than in the case of the private schools. It is therefore recommended that adequate measures and policies should be put in place to address and improve on ergonomic situations in public and private basic schools in Ghana in line with best practices as per the frameworks associated with the ergonomic phenomenon to safeguard the wellbeing and safety of teachers.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the study

Education plays a significant role in the socio-economic development of countries hence governments across the globe invest millions of dollars to ensure that the right environment is provided for teaching and learning to take place.

One of the key stakeholders in education is teachers. They deal directly with students and ensure that teaching and learning is realized. This implies that for the purpose of education to be achieved, teachers' role and working conditions need to be analyzed critically. Plethoras of studies have been conducted to assess teachers' effectiveness on teaching and learning and academic performance of students (Gardner et al., 2019; Yaluma 2017; Buhl-Wiggers et al., 2017; Azigwe et al., 2016; Heck, 2009; Rice, 2003).

Findings from these studies show a positive correlation between teacher effectiveness and student academic performance. However, majority of work cited on teacher effectiveness, measures effectiveness with the following variables: experience, certification, knowledge, behavior and level of professional development.

Due to the complex nature of education, the factors above cannot only determine the effectiveness of teachers but the school environment should also be assessed critically. Most importantly, the health and safety of the teachers and students. A general question that people often ask especially among service industry (for example teaching), is that how teachers or educators get hurt while discharging their duties? (OSHA.Gov, 2018).

This study therefore seeks to assess the ergonomics and occupational health situations among private and public schools in Ghana. The Occupational Safety and Health Administration, US Department of Labor define ergonomics as "the science of fitting jobs to workers instead of trying to get the worker to fit the job" (OSHA.Gov, 2018, p. 4). They asserted that ergonomics basically focuses on creating an enabling working environment that ensures the safety and comfort of employees. That is the primary aim of ergonomics is to ensure that the limitations and/or eradication of any health related work situation(s) that will impede the productivity of a worker. This concept is important because an employee working continuously with the wrong posture of their musculoskeletal system may be affected. If this becomes continuous the

employee may experience symptoms such as back pains, discomfort and fatigue which are initial signs for musculoskeletal disorder (Osha.Gov, 2018). For example, a study conducted by Loughborough University on behalf of Health and Safety Executive (HSE) revealed that more than 75 percent of primary teachers suffer from different forms of discomforts which are usually attributed to neck, shoulder and back problems. Similar a study conducted by National Education Union of the USA in 2011 on early years and primary teachers, revealed that 88 percent had experienced back pain; 73 percent had experienced shoulder and neck pain; 53 percent had experienced knee problems; and 33 percent had suffered hip problems (NEU, 2019).

Rantalaa, et al (2018) conducted a study to evaluate the association between voice and working posture during teaching. Using a sample of 30 teachers, they concluded that teachers' voice is largely affected by those who practices non ergonomics postures while speaking. Similarly, Ilavarasi, (2010) argued that there is a mismatch between teachers and table width and height hence teachers suffer from different musculoskeletal problems. From their study, they found that most teachers suffer from vocal problems, back pain, palm pain, foot pain, knee pain and neck pain. In assessing the role of ergonomics in the improvement of quality of education, Zunjic et al., (2015), concluded that the results of ergonomic research in education serves as a good starting point that allows for the creation of appropriate ergonomic designing solutions, aimed at solving existing problems. In Ghana, Dwira (2014) found that 98 percent of teachers and researchers suffer from different forms of ailments in their schools arising from compounding ergonomics such as type of furniture, physical environment, type of teaching materials, social environment and teaching aids. Majority of the respondents (86%) attributed their pains and discomfort to the type of furniture they use in the school.

1.2 Research Gaps

Many studies have assessed and established a relationship between work-related musculoskeletal disorders, ergonomic considerations and specific job features among teachers. However, additional research comparing the ergonomic situation and occupational health among teachers in public and private schools is lacking. More investigation needs to be carried out on ergonomic situations within which teachers performs their duties and how it impacts on their wellbeing to enable implementation of measures by their employers to support improvement of the working conditions of teachers in both public and private schools.

1.3 Statement of Problem

The importance of the teacher in the educational process is unquestionable. In the educational institution a teacher's role is crucial. The quality, competence, character and effectiveness of teachers are undoubtedly the most significant factors influencing the quality of education. This implies that the teachers with sound mindset and good health are more likely to be effective than their counterparts suffering any form of ailments. However, teachers work under different management systems and working conditions which affect their psychological states. In the UK, it has been found that many teachers suffer from different forms of discomfort such as neck pain, back and shoulder problems, hip problems and back pains (NEU, 2019). Ilavarasi, (2010) also reported similar discomforts such as foot pain, knee pain and neck pain among India teachers. Teachers from Ghana are not exceptional; studies have found that teachers suffer from similar pains outlined above and their discomfort is usually attributed to the kind of furniture, physical environment and teaching aids (Dwira, 2014).

The health and Safety of employees irrespective of the sector which is governed by the Ghana Labor Act, 2003, Act 651 is to ensure that employees are not exposed to conditions that would lead them to work related injuries or illnesses. Employees are also required to exhibit their duty of care in ensuring that they work as per the employers' standard operating procedures which must incorporate Health and Safety requirements. However, are the Ghanaian workers especially teachers and researchers in educational institutions and the employers aware of their safety and health responsibilities and obligations? The ergonomics and occupational health hazards are common in many occupation and occupational fields and affect numerous numbers of workers. Among them, the teaching occupation has got several associated ergonomics and occupational health hazards. These occupational hazards are commonly encountered and experienced by all teachers and others affect teachers of particular subjects. Consequently, occupational illnesses are not easily identified as injuries and many go unreported especially when the employer or worker is unable to link exposure with the symptoms the employees exhibit (Reese, 2009).

This probably explains the low number of reported injuries and illness among teachers as most of them may not be able to recognize the correlation between their working condition and such health issues they may encounter. Regrettably, not so much is known about the accident severity and frequency rate among teachers as the situation is further aggravated by challenges such as lack of effective legislation guiding ergonomic and occupational health and safety (E.O.H.S) management in schools, inadequate funds and also the challenge of changing

technology amongst others. In addition, teachers do not seem yet aware of the importance of reporting near miss incidents.

This study is therefore geared towards carrying out a comparative analysis of the ergonomic situations in the basic public and private educational institutions and how it impacts on the occupational health of teachers in each category of basic school.

1.3.1 Objectives of the study

The purpose of this study is to comparatively assess the ergonomic situation and occupational health of teachers in public and private schools in the Awutu Senya East Municipal Assembly of the Central Region of Ghana. The specific objectives of the study are:

- To assess the ergonomic situations in the workplace of teachers in the public and private basic schools in Awutu Senya East Municipal Assembly.
- To examine the impact of ergonomic situations on the wellbeing of teachers in public and private schools in Awutu Senya East Municipal Assembly.
- To compare ergonomic situations in public and private basic schools and the impact on the wellbeing of teachers in Awutu Senya East Municipal Assembly.

1.3.2 Research Questions

- How are the ergonomic situations in the workplace of teachers in the public and private basic schools in Awutu Senya East Municipal Assembly?
- What is the impact of ergonomic situations on the wellbeing of teachers in public and private basic schools in Awutu Senya East Municipal Assembly?
- How does the ergonomic situations on the wellbeing of teachers in public basic schools compare to that of teachers in private basic schools in Awutu Senya East Municipal Assembly

1.4 Significance of the study

There are several studies that have examined and concluded that the prevalence, nature, risk factors, number of years in teaching, vocal and physical symptoms have impact on quality of life and performance at work of teachers. The ergonomic consideration of physical teaching and learning facilities constitutes major determinants in the success of teaching and learning in higher institutions (Cheng et al, 2016; Alias et al 2019). However, research on the ergonomic and occupational health of teachers in public and private schools appear to be scanty. Few studies on ergonomics in Ghana was in respect to occupational disorders in Ghanaian

subsistence farmers, the impact of office ergonomics on employee performance, ergonomics and occupational health issues in diagnostic imaging in Korle Bu Teaching Hospital (McNeill and O'Neill, 1998; Asante, 2012; Ofori-Manteaw, 2015) among others. This research intends to bridge this research gap and the need for more findings on the impact of ergonomic situations and impact on occupation health of teachers in particular.

1.5 Scope and Limitation of the study

There are two main categories of schools in Ghana; the public schools and the private schools. The public schools are state funded while the private schools are privately owned and funded. Aside the differences in ownership, there are other eminent differences between these two categories. Class size, teacher-student ratio, classroom structure, teacher workload, academic performance and costs; serve as some of the differences between the public and private schools.

Based on these differences, this study is aimed at comparing the occupational health and work-related ergonomic situation between the teachers in private and public institutions in the Awutu Senya Municipal of Ghana in relation to their working environment. Selected teachers in the chosen municipal assembly in both public and private schools shall be used as a case study. Information for this study will be gathered from a sample of teachers at selected schools in the municipality.

The main challenges encountered in this study will be access to the teachers due to the lockdown of schools due to the COVID 19 pandemic. In addition, access to fund will be a challenge hence the researcher would have to fund the entire study. The willingness of teachers of the selected public and private schools to avail themselves to respond to all questions will also be a challenge which can impact on the outcome of the study. The researcher will therefore endeavor to make efforts that minimize the impact of these limitations on the outcome of the study.

1.6 Structure of this work

This study is organized into five chapters; the chapter disposition is described below:

Chapter One

Chapter one looks at the general introduction of the study. It covers the studies background, problem statement, the research objectives and questions, significance of the study, its scope, and limitation and how the entire project work will be organized.

Chapter Two

This chapter shall review relevant literature on the subject of ergonomics and occupational health and its impact on teachers' health. All major concepts and theories relevant to the study shall also be well defined and explained in this chapter to build a conceptual framework for this study.

Chapter Three

This chapter discusses in detail the methodology that would be employed for field data collection and how the data would be analyzed in the study. The chapter also gives a brief overview of the study area; Awutu Senya East Municipal Assembly in the Central Region of Ghana.

Chapter Four

Chapter four discusses and analyzes research data collection against the backdrop of the research objectives and questions and also seeks to provide interpretations and discussion of the findings that would emanate from the data analysis.

Chapter Five

This chapter concludes the study and presents summaries of recommendations and conclusions and its implications for further research work.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

The literature review chapter of the study provides an examination of related literature on the subject of ergonomics situations in the public and private schools in Ghana. The chapter draws on the works of esteemed researchers to help enhance a unified conceptual and theoretical performance mechanism framework suitable for this study. Specifically, the literature is reviewed from the conceptual review, theoretical review, empirical perspective, and conceptual framework perspective.

2.2 Conceptual Review

Over the years from the age of the industrial revolution, as formal and properly structured places of work begun springing, the day to day occurrence attracted some attention on the subject of safety leading disciplines such as occupational health and safety amongst others from which ergonomics became a topic of interest.

Ergonomics came into the limelight due to its relevance in ancient Greece culture during the 5th century (B.C), (https://en.wikipedia.org/wiki/Human_factors_and_ergonomics)(2020). The subject of ergonomics is a component of the Greek civilization as it informed the rationale behind how various tools, jobs and the places of work of the time were designed.

Throughout the course of life, various organizations and professional bodies have formulated some definitions for ergonomics as well as related areas such occupational health hazards and safety in relation to the work place.

The word ergonomics according to Te-Hsin and Kleiner (2001) is a combination of the two Greek words ergo, which means work and the 'nomics', which also means to study. Their definition of ergonomic thus is about the study of work.

The International Ergonomics Association, IEA (2008) defined it as follows; "Ergonomics (or human factors) is the scientific discipline concerned with the understanding of the interactions among humans and other elements of a system, and the profession that applies theoretical principles, data and methods to design in order to optimize human well-being and overall system performance."

From this definition, it can be deduced that the subject of ergonomics has everything to do with the environmental settings in a work place and how employees working in that work place interact on a day to day basis and how this environment impact on their physical, emotional and psychological experience each passing day of work. Although some workers may be naturally unconscious of how their work place setting impact on their well-being, by and large the overall environment has everything to do with a workers well-being even if they are not aware.

A review of a number of research works provides some definitions on the concept of ergonomics. According to Te-Hsin and Kleiner (2001), it is a discipline incorporating the process of designing systems, devices and the physical work conditions taking into consideration the workers suitable requirements and capacities. From the account of Tayyari and Smith (1997), ergonomics is a discipline geared towards the attainment of optimum co-existence for workers in the work environment.

Lee (2005) also stated that ergonomics provides for a suitability of systems for humans in the work environment. Similarly, Fernandez (1995) stipulated that ergonomic is associated with the designing of the place of work with machines, equipment, tools, products and systems with an environment that pays attention to the worker with capabilities that provide for psychological, physiological, biomechanical and physical needs with systems optimization for productivity and efficiency of work with an assurance of the workers' health, safety and wellbeing. He added that, in general terms, ergonomics aims at ensuring the fitness of worker for the work and not the worker for the worker.

Brooks (1998) also stated that ergonomics is an arrangement of components interacting with each other including the worker, the environment, the physical, the organization, the activities to be performed and the place of work as a whole.

Ergonomics and the subject of occupational health and safety became much more appreciated in in the late 1960's when the United States Of America's Occupational Health and Safety Administration (OHSA) proposed the policy by name "compensation-safety establishment" in response to addressing the issues of workers safety in the work place in the country. This policy was eventually implemented and enforced by Occupational safety and health Act, which came into force in 1970, Judson Maclaury(1984). Ergonomics which is also referred to as human factors is associated with the co-existence of people, technological devices or tools as well as environments within the work place.

The International Ergonomics Association, IEA (2008) (as cited in Ilavarasi et al, 2011) has divided ergonomics into three broad domains namely Physical, cognitive and organizational. The table below provides a definition of each as follows:

Table 1: Definition of ergonomics as per International Ergonomics Association's broad domains

Physical ergonomics	Cognitive Ergonomics	Organizational ergonomics
This has to do with areas such as physiological, human anatomical biomechanical and anthropometric characteristics which are related to physical activities.	is concerned with mental processes, such as perception, memory, reasoning, and motor response, as they affect interactions among humans and other elements of a system.	This also have to do with the optimizing socio technical systems such as processes, policies and organizational structures.

According to the Culturally Responsive Instruction Observation Protocol (CRIOP); "Ergonomics is a scientific discipline that applies systematic methods and knowledge about people to evaluate and approve the interaction between individuals, technology and organization" CRIOP (2010). The idea of ergonomics seeks to build a work environment with tools that enables maximum efficiency, health and safety of the worker. Related to ergonomics is the phrase Human factors defined as the scientific discipline where systematic methods and understanding of people towards evaluating and improving interaction between employees, technology (tools etc) and the organizations as whole, CRIOP (2010). Human factors enable the creation of work environments capable of contributing to the achievement of healthy, safe and effective operations.

2.2.1 Occupational Health and safety

Safety in the workplace should be an important factor to consider and should be the concern of every stakeholder at the point of designing jobs areas such as equipment to be installed, work processes associated with each job (Hughes and Ferret, 2003). This is because various forms of hazards and the possibility of some injuries and accidents can occur in the work by virtue of how the environment is set up especially when the humans to work in the work place were not

taking into consideration during the design and installation. Having in mind the fact that work related activities in the work are to be carried out by people can go a long way to set-up the work place in a way that will ensure minimal or no human errors leading to accidents and injuries. Employers for that matter owner of business entities should be sensitive to this reality so as to put in place policies and procedures that safeguards and provides assurance of safety for everybody working therein. There must be clear and deliberate plans, management controls and measures in place to prevent accidents, injuries and health issues instead of blaming employees for the occurrence of such undesirable incidents. Therefore, there is need to clear lines of communication and assigning of roles and responsibilities to each and every individual in the organization (Hughes and ferret 2003).

In the United States of America, it has been established that 10% of accidents occurring in the workplace are products of insecure situations and procedures including issues with amenities, another 15% as result of human error, while omissions and oversights in policies, procedures and practices accounts for the remaining larger 75%,(Meres et al, 2007). This means that directly embarking on safety inspections could go a long way to prevent or minimize the potential risk of workplace hazards. According to ILO, (2000), there are higher incidents of frequent occurrences of injuries in the workplaces as well as accidents and ill-health in developing countries than that of developed countries according to available data. This is largely because some organizations do not place much premium on workplace safety as much as they do in the area of employee productivity, (Mathew and Krush, 1990). The subject of safety in the workplace has been mentioned as a significant driver to measure workers health and safety (Geyer et al., 1990).

According to the WHO (2001), during the 19th century across Europe, there was an industrial revolution that highlighted awareness and concerns over health issues and risk associated with working conditions that were considered dangerous. Into the 20th century there arose rising concerns regarding ergonomics, health and occupational safety leading to the creation in 1919 the International Labor Organization (ILO). The International Labor Organization's constitution provides for the need to curb globally the threats and risk in occupational safety and health through an assessment of existing labor conditions as well as urging needed improvements. This was initially established in the United States of America primarily to provide assurance of health and safety for employees, with the authorization to enforce standards that were

developed as part of the act. It was also intended to assist the States of the country with research findings, training and education in the occupational health and safety field as well as other areas of relevance. Similarly, the European Union also brought to light its Health and Safety Act in 1974 which was a product of findings from the research of the Roberns Report that was published earlier in 1972. The conclusions and recommendations derived from that research work was the basis for the formulation of the health and Safety Act (1974). As a result, during the past 20-30 years, the subject of workplace safety and occupational health has seen a lot of improvement in majority of developed countries. However, the situation in developing countries pertaining to workplace safety and health is comparatively not clear as result of poor data collection and record keeping and reporting mechanism on accidents and diseases that may have occurred. There are about 250 million occupational health issues and accidents occurring every year across the globe with developing countries accounting for the greater percentage, Dwira (2014).

WHO (1994) stipulated that “In the most favorable circumstances work provides the income and quality outcomes and also have positive impact on social, psychological and physical health and well-being. In spite of these the fact that conditions at work and work environment, in many countries still involve distinct and even severe hazards to health that reduces the span of working of individuals” (Dwira,2014). The incidents of slippage and falls form a significant area of concern with regards to workplace environments health and safety issues. According to Courtney *et al*, (2006), slip and falls similarly was the cause of 20-40% of work-related accidents in developed countries in the year 2005. According to the Liberty Mutual Workplaces Safety Index, in the United State of America there is projected £6.9 billion direct cost annually due to disabling workplace falls. Similarly, such falls is known as a leading source of occupational injuries in Taiwan (Theodore, 2006). As reported by EUROFOUND (2007) (Gbadago *et al.*, 2017), most workers are faced with exposure to health risk at their places of work. And that that the security and occupational wellbeing of workers largely is a product of the work environment and the kinds of hazard the workers are exposed to. Physical Hazards such as noise and radiations; ergonomic hazards like carrying heavy and bulky equipment; chemical related hazards like disinfectants and asbestos, poor postures such as sitting or standing work postures, uneven work schedules like night shift and other kinds of shifts and rotations, uneven working hours and days as well as some other kinds of violence and harassment are eminent in the workplaces. As concluded by Gabriel *et al.* (2013) in their research, there is antagonistic correlation that exists between the occurrence of workplace accidents and injuries and the

performance of employee. They were of the firm conviction that the incidents of injuries and accidents in the work place can be minimize should there be substantial investments in measures towards safety and occupational health practices in the work place. And that there is a direct positive outcomes from such efforts including reduction in absenteeism, reduction in mental health issues, and reduction in physical trauma as result of fear of working in an unsafe environment, all of which culminate in positive impact on employee performance and ultimately increasing productivity of employees. (Gbadago et al., 2017)

A research by Ward *et al.* (2008) also affirmed previously documented views that organizations who invest in promoting occupational safety and health reaps various direct benefits from such investments. They posited that when management is able to give employees the comfort that they care about them, that is a clear indication of how well management is handling Occupational Health and Safety (OHS) issues in the organization. This goes a long way to ensure a safe work conditions which leads to benefits including improvement in the morale of staff, reduction in stress levels, reduction in absenteeism, improvement in the health of employees, improvement in employee motivation and job satisfaction, reduction of illness and injuries and ultimate reduction in medical expenses. They also concluded that having an efficient and effective OHS management systems in place have a positive impact on the institutional performance outcomes, positive employee behavior towards work as well enabling a more positive working environment which assures employees of safety, security and health.

Another study by Muchemedzi and Charamba (2006) revealed that occupational safety and health is "a science concerned with wellbeing in connection with job setting". Also, Oxenburgh et al. (2004) indicated that the security and well-being of employees in a work environments correlates to the level of profitability of the organization.

2.2.2 Ergonomics and Occupational Health in the educational sector

Countries across the world have widely accepted education as a means to enlighten and empower it citizenry to make them competent and economically functional in order for them to be able to contribute towards national development. As a result, education at the basic school level is avenue for the development of manpower culminating into enabling the aspirations of nations to come into fruition. However, these objectives of empowering citizens through the provision of education cannot be achieved if the environment where it is delivered does not have an acceptable level of safety and comfort for the stakeholders involved in the process. This therefore calls for the need to design the educational set-up with facilities and accessories that makes it conducive for all stakeholder including teachers who are at the forefront of this

process. Facilities and accessories such as classrooms or lecture halls fitted with, accurately installed chalkboards where teacher do not need to strain themselves to write on, well fixed ceilings and roofing devoid of leakages, adequate lighting system, safe floors devoid of cracked or rough surfaces, good ventilation, provision of toilet facility and several other accessories ought to be in place to ensure the learning environment of conformity to workplace ergonomics and safety standards. Where such measures are not in place in the learning environment, the safety of users may be affected which can invariably affect the quality of learning and knowledge acquisition as the physical health of teachers and other stakeholder could be affected. When ergonomics and safety standards are aligned to the expected set up of the work environment assuring the health and safety of employees and users, it goes a long way to make the work environment user friendly which enhances effectiveness and productivity of employees, (Uche, 2015).

The conformity to safety standards and quality of the learning environment of an educational institution, has a direct impact on the output of the graduates produced, (Uche, 2015). Also, the level of satisfaction and fulfillment derived by stakeholders in the educational process is a function of the quality of the teaching and learning environment, (IEA, 2008). It is almost an established fact that educational objectives cannot be achieved in an unsafe environment with teaching learning facilities that are detrimental to the health of its users, (Uche, 2015).

As posited by Linus (2007) there has been a growing and increasing ergonomics concern over the number of teachers who in one way or the other have been affected by poor workstations design. Per the nature of the work of teachers in the education delivery process it is of necessity their work environment is equipped with adequate comfort and safety measures. For instance teachers needs comfortable tables and chairs for their work as they often need to spend several hours sitting during marking of students work and preparing their lessons notes amongst others. It has been proposed by ergonomic specialist over the past century that there is the need for humans to sit upright (Hooton, et al., 1945). According to Dainoff (1994) one needs to have “cubist posture” when sitting, .i.e. 90°knee, torso and elbow positions which is aimed at preventing ergonomic risk factors capable of resulting in health disorders and discomfort. In the later part of 1980’s it came to light that the office work environment poses some levels of hazards to human life contrary to the thought of it being safer than other places such as the factory, farms and other obvious hazardous work environments. This is because working in the office involves long hours of constrained sitting postures which can result in various forms of health issues and disorders especially when some notable risk factors arises, (Cohen et al., 1997). It is therefore necessary that office work environments are designed with

adequate support systems such as the office chairs that support the back of the user. Office chairs must equally allow users to easily move the position of their legs and to easily vary their working position as and when they need to (Linus, 2007). In the classroom, the lack of suitable chairs and desk for teachers in the appropriate size and shape is indeed a problem as far as ergonomics is concerned. It is also worth mentioning that the need for teachers to carry heavy materials around the school especially climbing stairs up or down is an issue of concern as this can lead to injuries for the teacher. Since the emergence of ICT in the education system, it has become the norm for teachers and their students to spend some amount of time sitting behind computers during studies. The computer lab or classrooms installed with computers therefore requires ergonomic standards and other health and safety measures to safeguard the health and safety of users. Such provisions in the computer lab or classrooms with computers has been touted as the rationale behind the increase in efficiency of teachers handling computer studies is to improve performance, reduce fatigue and higher retention rate of competent employees (Peter & Button, 1992). Appropriate setting of computers is very crucial towards the prevention of pain and injuries. It is important for computers to be installed in a manner where the teacher can sit before it directly and perpendicular to the lighting system in the classroom or office. Screen protectors are equally necessary to ensure eye protection for the users.

Ergonomics issues and occupational health hazards have been cited as a very common phenomenon in most place of occupation and have an effect on workers. Among other things, in the teaching profession, a number of ergonomics and occupational health related issues and hazards have been identified. Teachers especially those handling certain subjects and other educational stakeholders are confronted by these hazards and health concerns frequently in their work. Unfortunately, due to the nature of these occupational health issues, workers who are affected are often not readily identified on time as such incidents may not be reported. This may be due to the fact that the employer or worker may not be able to link such health issues with such work conditions at the work place (Reese, 2009). This accounts probably for the low reported number of illness and injuries among teachers, in relation to the effect of their workplace safety conditions. Also, there is not enough data on the severity and frequency rate of accidents among teachers (Litch, 1973). This is probably because; there is lack of consciousness on the part of teachers in recognizing the importance thereof and reporting such incidents to their employers. This is further heightened due to the absence of effective legislation for guidance for management of school on Ergonomic, Occupational Health and Safety (E.O.H.S), as well as lack of funding and the impact of emerging technology.

Aryal (2007) was of the view that majority of teachers do face numerous day to day psychological and physical problems due to the nature of their work load and the stress levels in their schools. These problems arise from physical agents, psychosocial environment and also the length of the working hours. As established by Smith, Namara and Wellens (2004) players in the profession of teaching and research are confronted with a myriad of hazards such as shift work and noise etc., According to Dangol, (2007) stress at the work place, psychological overload and ergonomic risk factors are detrimental to the workers capacity to perform and as result also affect their health as there has been reported incidents of workers with stress symptoms.

The subject of occupation health and ergonomics in the education sector calls for efforts on the part of school administrators and managers to provide an environment suitable for the learning processes. The design of the working environment of the teacher should be made up of optimized workflows and ergonomics situations capable of engendering high performance standards. The design of the office is a factor worth considering as it impacts the workers occupation wellbeing. For example, teacher with partial disability could be supported through rehabilitation by way of being assigned with suitable activities in line with their mental and physical limitations which can go a long way to substantially enhance their productivity and work capacity, WHO (2001) and WHO(1998). Standing at the work place is considered a most favorable work position in some sectors of work because of offering significant physical mobility and freedom to the worker. Also, it is also known that standing at work has proven to increase the workers' productivity and work efficiency among. However, the act of standing upright for too long or prolonged standing could lead to fatigue, physiological pain as well as common physical health problem known as musculoskeletal disorders (MSDs),(Mohd, 2013). A teacher is likely to be subjected to daily prolonged standing posture if his or her working teaching period of the day spans across up to half of the day. As result, when a teacher spends several hours in standing posture during the day, they are likely to endure pain and muscular exhaustion. Teachers going through such experience could possibly suffer musculoskeletal injuries as result of the lengthy run during the day. (Halim, 2011).

2.2.3 Occupational health in Ghana

In Ghana, the occupational health of employees and working standards/conditions are enshrined in the Workman's Compensation Act 1987 (PNDCL 187). The act provides detailed

explanation of the provisions and compensations due employees should they be involved in any case of an eventuality while at post. This applies to both public and private institutions and agencies. Although the Workman's Compensation Act has always been in place, issues of the safety and occupational health of employees was overlooked until the coming into force of the Ghana labor Act 2003. This new Act has thus compelled all employers(public and private) operating in the country to comply with Act 651 of the labor Act 2003 in order to ensure their employees protected from hazards and other health conditions capable of leading illnesses and injuries. The Act provides various details on employer obligations towards and spells out health and safety measures and mechanisms required so as to ensure employees work in a safe and incidence free healthy environment.

In the teaching profession in Ghana, a professional body such as the Ghana National Association of Teachers (GNAT) has in collaboration with the Ministry of Education enforced a monitoring mechanism that is intended to safeguard the safety and health of teachers. The Act also stipulates compensatory policies and allowances required to ensure employees are well catered for in the event of ill health or injuries arising from work. Across the several sectors of the employment space, there are designated agencies mandated to provide a monitoring of each sector. These designated agencies are each responsible for employee safety at the workplace across all places of work. However, there is no professional body or authority, as well as National policy or a process in place to govern issues of Occupational health, Safety and ergonomics presently in Ghana.

Agencies such as the Environmental protection agency (EPA) which is responsible for regulating all activities that affects the environment, backed by the EPA Act 490, National Road Safety Commission(responsible for maintaining order and safety roads in Ghana and Minerals commission(responsible for regulating mining related activities). The National Road Safety Commission is responsible for enforcing standards and guidelines to ensure safety for the transport industry as well as protecting pedestrians among others. The Minerals Commission is backed by the Mining Regulations 1970 which provides guidelines in Occupational health and Safety for employers and employees in the Mining Industry. A study conducted by Occupational Health Program Unit of the Ghana Health Service, brought to light that most workers work under conditions that are detrimental to their health and also not given education on issues of occupational health and safety (MOH/GHS, 2010).

In a nutshell, although there are enormous provisions for addressing health and safety issues in the various employment sectors in Ghana not so much of these has been provided in the educational sector. There are no measures in place for evaluating various interventions in schools as the school environment is seen as not being a workplace compared to other sectors of work. As a result, efforts' being made in the educational sector with respect to ergonomics, health and safety emphasizes much more on the students or pupils rather than on the teachers. Meanwhile, occupational health and safety with a focus on teachers ought to be an integral part of the school environment. This should include ensuring a design and setting up of schools as a place of work just like any other with framework that is aimed at enforcing and assuring the health and safety of teachers.

2.3 Theoretical Review Of Ergonomics and Occupational Health

This section of the literature will focus on theories related to the subject matter of this study which is ergonomics and occupation health in order to establish theoretical framework out of which a conceptual framework shall be crafted to form the basis of data collection, analysis, discussion and drawing conclusions in line with the objectives of the study. They include; Social ecology theory, Human factors and ergonomics and the ergonomic risk factors

2.3.1 Social ecology theory

The social ecology theory was derived from the systems theory. The theory basically provides for a number of principles that enables an understanding of the relationships and complexities in the interaction that exist between diverse individual, ergonomic and social ecological impacts on human health and behavior (Stokols, 2000). The social ecology theory by definition is a study of groups and individuals in the context of numerous social systems related to them. The social ecology theory features a number of central assumptions such as; the interaction of physical environment as well as the social situations and their mix with the personal attributes of human beings including behavior and body temperature. The theory stipulates that some human behaviors, social status and conditions in the environment where an individual lives could wield some amount of inconsistent influence on their health (Grzywacz and Faqua, 2000). Some individuals for instance may cultivate some unhealthy sets of lifestyles due to the their life situations in areas like working in a stressful work environment and living far from one's place of work requiring long travel on the road from home to work amongst others. Such life circumstances coupled with other work place factors could adversely results in unhealthy lifestyles such as lack of physical exercise, poor eating habits excessive intake of alcohol and

smoking and other behaviors that can be detrimental to their health. The theory of Social ecology is accredited to Murray Bookchin (Stokols, 1992) as he was the first to advance the principles that are being applied in describing this area of study. The principles offer the set of apparatuses in the investigation of health related issues with regards to current work place social and physical environments. The principle affirms that any form of interactive straining in the workplace, where the workplace is not equipped with the needed support for personal and social fulfillment; such a work place's other set of installations notwithstanding will result in negative outcome in the health of those working therein. (Stokols, 1992)

2.3.2 Human factors and ergonomics

Jastrzebowski formed a philosophical dissertation in the year 1857 in Poland, on the topic 'An Outline of Ergonomics or the Science of Work'. This dissertation however was not in the academic domain until the recent past decades. The field of ergonomics was established after the second world war in the United Kingdom(Britain). In 1949, Murrell led the re-invention of the name ergonomics even though there were some objections as the name sounds confusing and similar to the word 'economics'. The earlier focus of ergonomics was on workplace design, installation of equipment and other interdependent areas such as human anatomy, industrial medicine, physiology, design, lighting engineering and architecture etc. The subject of ergonomics was much strongly inclined to the field biological sciences in European context.

A comparable field of study known as 'Human Factors' emerged in the United State of America, however it was largely rooted in the field of psychology as its scientific roots; i.e engineering psychology, human engineering and applied experimental psychology.

The subject of ergonomics and human factors has continually had some similarities, although their evolution has not been on the same path. In the area of human factors, the focus is on the process of integrating human centered features as part of the overall design of systems and processes. This has led to the attainment of extraordinary outcomes during designing of huge systems in industries including aerospace, notably the USA space programme as well as NASA etc. Ergonomics in the European context is often times more fragmented and is traditionally tied to the basic sciences and sometimes to some subject matter and application areas. From the account of Hagberg et al. (1995), human factors and that of ergonomics in the work place are seldom applied interchangeably. They both however, define an interface existing between humans and the work they do. The only difference is that ergonomics emphasizes on the effect of work on the worker whiles human factors focuses on the need to design the workplace to reduce the possibility of human errors leading to injuries and other health issues.

2.3.3 The ergonomic risk factors

Ergonomic risk factors are a number of workplace situations that can directly or indirectly affect the health and safety of workers. They are basically conditions and situations with the likelihood of triggering incidents of injuries and other health issues with adversarial effect on the health of workers. The term risk is usually defined in terms of the frequency of injuries or accidents resulting from a given exposure. In a worst case scenario, risk of injury is rated with a very low probability but comes with enormously great significance (such as multiple fatalities) or much higher probability but may come with lower severity in terms of consequence (includes a worker tripping and slipping), (https://www.osha.gov/sites/default/files/2018-12/fy15_sh-27643-sh5_ErgonomicsWorkbook.pdf). Risk likewise is spontaneously relative across and within work situations. Risk entails the probability of injury or a health issue occurring hence the likelihood of its occurrence is a function of how much risk is prevalent in the work environment although it is unlikely workers will experience injuries or other safety and health issues all the time, (https://www.osha.gov/sites/default/files/2018-12/fy15_sh27643sh5_ErgonomicsWorkbook.pdf).

Bongers et al (2002) were of the view that making the workplace safe with appropriate risk mitigating measures is capable of enhancing the health and safety of workers. However, if there are no injuries or health issues in a work place, it does not necessarily mean there are no risk present in that work environment. Risk factors basically are conditions and actions that upsurge the probability of injuries such as the musculoskeletal system and other health issues.

The literature relating to the application of ergonomics recognizes notable sets of physical risk factors associated with many sectors of works. (Nur et al., 2016). While physical risk factors carries important critical risk factors, some other significant factors including mechanical hazards, organizational factors and psychosocial factors capable of provoking disorders and other forms of ultimately influencing the consequence of the obvious physical risk factors. There are basically three identified category of risk factors. They include individual risk factors, biomechanical exposures as well as psychosocial stressors (Kolgiri et al., 2016). Biomechanical exposures are factors including work place with poor interior design, high forces, misalignment of neutral body alignment and repetitive motion, (WHO,1998).

Psychosocial stressors in the workplace are factors including high level of work stress, inadequate social support, time pressure and inadequate controls in the workplace. (Chaiklieng & Suggaravetsiri, 2012)

Factors such as age, gender (such as in the case of females), allergies and negative reactions such as stomach reactions, unacceptable rest time, over working and domestic or house chores responsibilities are the composition of the individual factors category. According to NIOSH, (1995) ergonomics hazards include conditions in the workplace and physical stressors capable of increasing the probability of injuries and illness to employee's musculoskeletal system. A particular kind of hazard that are of great concern and capable of producing aggregate consequences on the worker are known as Cumulative Trauma Disorders (CTD) also referred to as work-related musculoskeletal disorders (WMSDs) (Kolgiri et al., 2016). Also, these kinds of hazards are referred to as repetitive strain injury (RSI) in Canada. In the United Kingdom, Japan and Sweden, they called cervicobrachial syndrome or occupational cervicobrachial disorder. (Yassi, 1997) from his work listed the following as the common disorders attributable to injuries arising from repetitive strain; Tendon related disorders, Peripheral-nerve entrapment and Neurovascular/vascular disorders. Also, the definition by NIOSH (1997) in terms musculoskeletal disorders is as follows;

- (1) Disorders of the muscles, nerves, tendons, ligaments, joints, cartilage, or spinal discs
- (2) Disorders that are not typically the result of any instantaneous or acute event (such as a slip, trip, or fall) but reflect a more gradual or chronic development (nevertheless, acute events such as slips and trips are very common causes of musculoskeletal problems such as low back pain).
- (3) Disorders diagnosed by a medical history, physical examination, or other medical tests that can range in severity from mild and intermittent to debilitating and chronic Disorders with several distinct features (such as carpal tunnel syndrome) as well as disorders defined primarily by the location of the pain (i.e., low back pain)

According to Yassi, (1997), ergonomic risk factors capable of causing MSD are forceful and repetitive and movements, mechanical stress, temperatures extreme, static muscle load, awkward postures and vibration. Also, according to Westgaard and Winkel, (1997), there are psychosocial and physical factors which include emotional and cognitive stress associated with day to day work schedules, individual psychological factors, social relationships, lighting, administrative concerns, indoor climate and noise levels attention must be paid to. According to Bongers et al. (1993) and Vasseljen and Westgaard (1996) these factors however, could culminate into musculoskeletal hazard even if there are no mechanical exposures.

The results from a previous landmark study by Bigos et al.(1991) which spanned over a four year period of observation, it came to light that, aside some individuals having a prior back problems, the perceptions at the work place and other psychosocial reactions were also

identified as factors associated with reporting low back pain. Aside the three main identified risk factors (individual risk factors, biomechanical exposures and psychosocial stressors), there are also organizational factors that can impact on the health and wellbeing of workers especially when coupled with the three main risk factors. Organizational factors are equally capable of increasing the risk of CTD's for workers. They include factors such as duration of work, excessive work rates, externally paced work, monotonous work, job insecurity and inadequate work breaks or rest periods (NIOSH, 1995; Chatterjee, 1987; Gerr, Letx and Landrigan, 1991). Additionally, whenever two or more of these risk factors exist at a work place, the probability of CTD goes up significantly (Silverstein et al., 1986). Individual risk factors such as obesity, poor eating habits and lack of physical exercise or activity etc. could equally increase the possibility of CTDs (Nathan et al., 1992b). Physical activities like playing the sport of racket is associated with health issues such as tenosynovitis, tendinitis, peripheral nerve entrapments and degenerative joints diseases amongst others.

An epidemiological studies and an ergonomic investigations that have been carried out for most part was focused on the relation between these risk factors and the occurrence of these musculoskeletal disorders especially in the neck, arms, shoulders and back(Winkel & Westgaard, 1992; Kilbom, 1994). According to Li and Buckle (1999) there has not been much recorded incident of work-related musculoskeletal health issues associated with the lower part of the body as compared to that of the upper-body.

According to Hunting et al.(1980), and Westgaard and Aaras(1984) unnatural standing or sitting working postures constitutes the most central risk factors related to various occupation musculoskeletal disorders, however such risk factors may not be the only factors that should be of concern. Duration of work, frequency of work and application of force are equally considered as important factors to pay attention to according to Kilbom (1994); Winkel and Mathiassen (1994). As result in evaluating ergonomic risk factors, all these factors must be taken into consideration and should be measured as well.

2.4 Conceptual Framework

In this theoretical review section of this study the following main theoretical themes have been discussed. They are the social ecology theory, human factors and ergonomics and ergonomic risk factors. Social ecology has to do with the study of groups and individuals in the context of numerous social systems related to them with emphases on the interaction of physical

environment with social situations and their mix with the personal attributes such as behavior and body temperature. Human factors and ergonomics focuses on the interface existing between humans and the work they do where ergonomics emphasizes on the effect of work on the worker while human factors focuses on the need to design the workplace to reduce the possibility of human errors leading to injuries and other health issues. Finally, ergonomic risk factors look at a number of workplace situations with probability of occurrence which is capable of affecting the health and safety of workers directly or indirectly should they occur. These risk factors are made up of workplace situations with the likelihood of triggering incidents of injuries and other health issues with adversarial effect on the health of workers. Three main categories of risk factors that were discussed included individual risk factors, biomechanical exposures as well as psychosocial stressors. Organizational factors were also reviewed as equally capable of increasing the risk of CTD's for workers through factors such as duration of work, excessive work rates, externally paced work, monotonous work, job insecurity and inadequate work breaks or rest periods. In line with the objectives of this study, the interest of the research is to identify all the possible factors and features of the workplace of teachers that falls within the concepts and framework of the subject of ergonomics

The literatures and theories reviewed so far provides a basis that; there exist a relationship between ergonomics situation and occupational health and wellbeing of workers in the workplace. However, for the purpose of this study the researcher shall focus on the common risk factors relevant to the work environment of basics schools.

The conceptual framework of this study has therefore been depicted as in Figure 2.0 below. The conceptualized framework defines the set of working environment elements that can be categorized within the reviewed ergonomic risk factors capable of impacting negatively on the wellbeing of teachers. In the context of this study, to assess the ergonomic situations of the workplace of teachers of basic schools, the researcher shall focus attention on the following category of workplace risk factors in relation to the workplace of teachers; Mechanical Hazards, Organizational factors and Psychosocial and Physical Factor. These ergonomic risk factors per the reviewed literature and theories shall form the independent variables of the study while the wellbeing of teachers shall be the dependent variable. This model was formulated as a result of the researcher's perspective of how ergonomics situations are capable of affecting teacher's wellbeing.

Table 2: Frame work for impact of Ergonomic situations on the wellbeing of public and private basic school Teachers

Independent Variable		Author(s)	Dependent Variable
Ergonomic Risk Factors	Example		
Mechanical Hazards	Awkward work postures(sitting and standing postures) Mechanical stress Static muscle load	(Yassi,1997)	Teachers wellbeing in public and private schools
Organizational factors	Excessive work rates Duration of work Inadequate work breaks Teacher's awareness of health and safety at work	(NIOSH, 1995), (Chatterjee, 1987) and (Gerr, Letx and Landrigan, 1991)	
Psycosocial and Physical Factor	Office and Class Room Furniture Interior Fittings and flooring Psychosocial factors Administrative concerns	(Westgaard and Winkel, 1997), (Bongers et al, 1993) and (Vasseljen and Westgaard, 1996))	

Source: Authors own construct (2020)

2.5 Hypothesis Testing

To achieve the objective of this study, there is the need to test hypotheses to ascertain the relationship that exist between the independent variable and dependent variables of the study. The independent variable is ergonomics whiles the dependent variable is the wellbeing or occupational health of teachers. To be able to carry out this test, the following hypotheses were formulated based on the theoretical background of the study.

(H_n/H₀): The ergonomic situation in the work place of teachers in private and public school does not affect the wellbeing of teachers

(H_A/H₁): The ergonomic situations in the workplace of teachers in the private and public schools affect the wellbeing of teachers

CHAPTER THREE

3.0 METHODOLOGY

3.1 Introduction

To achieve the objective of a study, the researcher has to follow certain methods. The method to achieve the objectives of this study is well discussed in this chapter. It entails the research design, data collection, sources of data, data needs, population, sample size and sampling techniques, the model used and how the entire data collected will be discussed and analyzed.

3.2 Research Design

The research design is the blue print or plan for this study (Burns and Grove, 2003; Parahoo, 1997). The research design of a study depends on the nature of the research questions (Yen, 2003). The main research question of this study is to assess the ergonomic situation and its impact on the health of teachers in public and private schools in the Awutu Senya East municipality. In addressing this question and taking a cue from some similar studies conducted by (Osei-Poku et al., 2012; Okrah, 2011), the quantitative research design which is a methodology for conducting research that involves collecting, analysing and integrating quantitative (e.g., experiments, surveys) shall be used for this study.

The cross-sectional study, the descriptive survey and a case study approach shall be applied in this study. This research design approach was adopted because according to Oppong (2013) it will enable the researcher to gather information about the present existing condition and present a detailed picture of existing phenomena in terms of the relationship between the independent variable of the study; ergonomics and the dependent variable; wellbeing of teachers in the selected case study. This technique is useful because it helps in identifying and obtaining relevant data on the features phenomena which in this research, is the impact of ergonomic situations in public and private schools on the health of teachers working in such schools in the selected location. This design was adopted due to the fact that it allows for an in-depth or critical exploration of a problem (Creswell, 2003).

3.3 Population

The population for this study will be all basic school teachers in both public and private schools in the Awutu-Senya-East Municipal of the Central region of Ghana. There is an estimated 1,156 basic schools in the municipality made of up 70 Public schools and 1,086 Privates schools (Ghana Statistical Service, 2018). There are also 728 basic school

teachers in these 1156 basic schools made of .612 in the public schools and 116 in the private schools.

3.4 Study Area

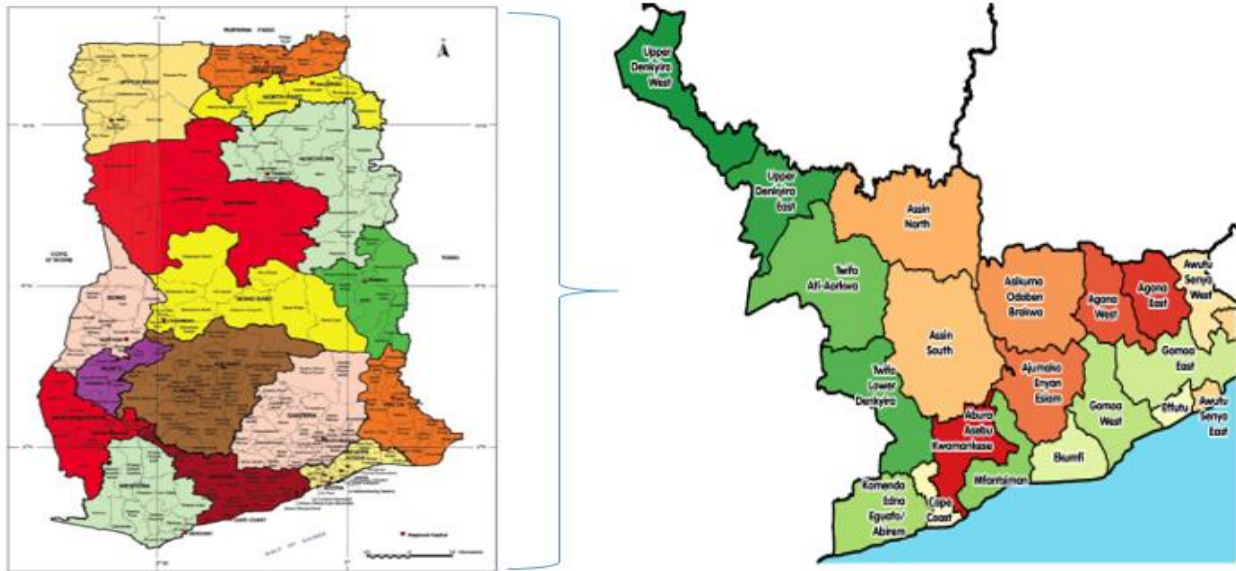


Figure 1.0: Map of Ghana and Central region and Awutu Senya East municipality

The study was conducted across purposively selected schools in the Awutu Senya East Municipal of the Central Region of Ghana. Awutu-Senya-East Municipal is one of the 260 Metropolitan, Municipal and District Assemblies (MMDAs) in Ghana and it forms part of the 22 MMDAs in the Central Region. With its Administrative capital at Kasoa the municipality was carved from Awutu Senya municipality and forms part of the new districts and municipalities that were created in the year 2012 which were inaugurated on the 28th June, 2012.

The Municipality covers a total land area of about 108.004 sq. km, about 1.1 percent of the total land area of the Central Region. The Awutu Senya East Municipal is located in the eastern part of the Central Region. It shares common boundaries with Ga South Municipal (in the Greater Accra Region) at the east, Awutu Senya West District at the north and Gomoa East and Effutu District at the west and south respectively.

The population of the Municipality according to 2010 population and housing census stands at 108,422(estimated to have reached 127,689 as of 2017 according to a survey by the Ghana health service, The Health Sector in Ghana, Facts and Figures, 2018).

According to a research data from the Statistical service of Ghana conducted in 2017 there are 1,156 basic schools and 728 basic school teachers in the Awutu Senya East municipality as shown in the table below.

Table 3: Number of Basic Schools in Awutu Senya East District

Item	Public	Private	Overall
Number of Schools	70	1,086	1,156
Number of Teachers	612	116	728

Source: Ghana Statistical Service (2018)

3.5 Sampling and Sample Size

According to Burns and Grove (2003), sampling is a process for selecting a group of people, events or behaviour with which to conduct a study. A sample is a portion representing the whole population (Polit et al., 2001) hence the ability to generalize the research outcomes.

Per the available data on the population of the study, in order to compare with minimal biase, there was the need to sample each category school according to the population in that category of school. Therefore to obtain a balance sample size the researcher adopted

$$n = \frac{N}{\left[1 + N(\alpha)^2\right]}$$

the formula proposed by Yamane (1967) which is where n is the required sample size, N is the population size, α is the error term. This formula was used with a confidence interval of 90% and an error margin of 10%. The Table 3.1 below provides the calculation of the sample size for each basic school based on Yamane (1967)'s formula.

Table 4: Sample size

	Public	Private	Total
Number of Teachers	612	116	728
Sample size	86	54	140

In addition, in terms of sampling, a non-probability sampling was adopted with the help of purposive and convenience sampling. Purposive sampling was used to interview basic school teachers who work at purposively targeted basic schools to gather information for the study. Teachers in public and private schools were purposively selected to aid data gathering for the study. Permission was sought from the Head masters of the targeted basic schools before the researcher embarked to gather data from respondents. The researcher explained the project to prospective respondents and personally asked them if they wanted to take part in the exercise. Based on their responses, the researcher selected prospective respondents and administered the questionnaire among them.

3.5.1 Sample Frame

The sample frame for this study shall be a total of 140 teachers drawn from both public and private basic schools. The breakdown is as follows; 86 teachers from public schools and 54 teachers from private schools. The total targeted sample size of respondents shall therefore be 140.

Table 5: Sample frame

School Category of Respondents	Number of Teachers per school
Public schools	86
Private schools	54
Total	140

3.6 Instrument

The tool for data collection was a questionnaire which was adopted from the Standardized Nordic Questionnaire in line with the research questions. The questionnaire deals with the ergonomic situations in the selected schools as well how it has impacted on the health of the teachers working in the selected public and private schools.

The advantage of designing a questionnaire for researches is that it allowed statistical analysis of data feedback and reduces bias. It also provides a uniform question presentation and no middleman bias. It does not allow verbal or visual clues to influence respondents thus ensure responses are based on respondents own interpretation of the questions. Apart from the primary data, the researcher collected the secondary data from

historical records of research journals and research articles relevant to the subject matter of the study.

3.7 Data Collection Procedure

The entire process took a period of twelve weeks for questionnaire administration, data collection, collation and analysis. Respondents were required to complete an online survey which was estimated to be completed within a space of 15 minutes. The data gathered was downloaded and collated after getting the respondents to complete them online. The data was sorted out and collated outcomes in tandem with the conceptual framework. This ensured that the outcomes reflected quality, accuracy and completeness of expectations.

3.8 Data Analysis

The researcher used statistical tools to sort, arrange, collate and measure the outcomes to generate meaningful information. The process was active and interactive. Empirical study was conducted to help investigate the objectives of the study by discussing and analyzing the data using SPSS. It aided in analyzing the data quantitatively and also gives pictorial analysis of the results using pie charts and histograms to explain the relationship between the variables. As this is a quantitative study the descriptive elements of the results were also analyzed in line with the relevant objectives of the study.

3.9 Ethical Considerations

Respondents for the study, who are teachers of both public and private schools selected from the targeted schools, may have ethical and privacy responsibilities concerning revealing of information relating to their private health life. To address this ethical challenge, the researcher obtained permission letter from the district education directorate and also thoroughly explained the objectives and purpose of the study to the sampled respondents with the option for respondents to choose to opt out of the study. Secondly, respondent's personal details such as names were not taken. This helped to keep respondent's identity confidential. In addition to this, the following ethics were observed:

- Honesty- The researcher strived for honesty in all communications. The researcher honestly reported data, results, methods and procedures.
- Objectivity- The researcher strived to avoid bias in the design, data analysis and data interpretation.

- Integrity- The researcher kept promises and agreements; acted with sincerity;
- Respect for Intellectual Property- The researcher honored patents, copyrights, and other forms of intellectual property.
- Confidentiality- The researcher protected confidential communications and information.
- Responsible Publication- The researcher will publish in order to advance research and scholarship.
- The researcher therefore, in a nutshell, assured respondents of anonymity and privacy through a letter of consent.

CHAPTER FOUR

4.0 RESULTS

4.1 Introduction

This chapter comprises of presentation, analysis and discussion of the findings in relation to the study objectives and can be evidenced below. A total of 140 purposively selected respondents were invited by email with a link to the online questionnaire to participate in answering the questionnaire of the present study. As the process of the data collection was purposively driven, 112 out of the 140 invited respondents participated in answering the questions, for a response rate of 80 percent. The analysis therefore, presents the views garnered from the 112 respondents.

4.2 Demographic Characteristics of Respondents

The following demographic characteristics of respondents were analyzed; gender, age, level of education and category of school (public/private) where the respondents works.

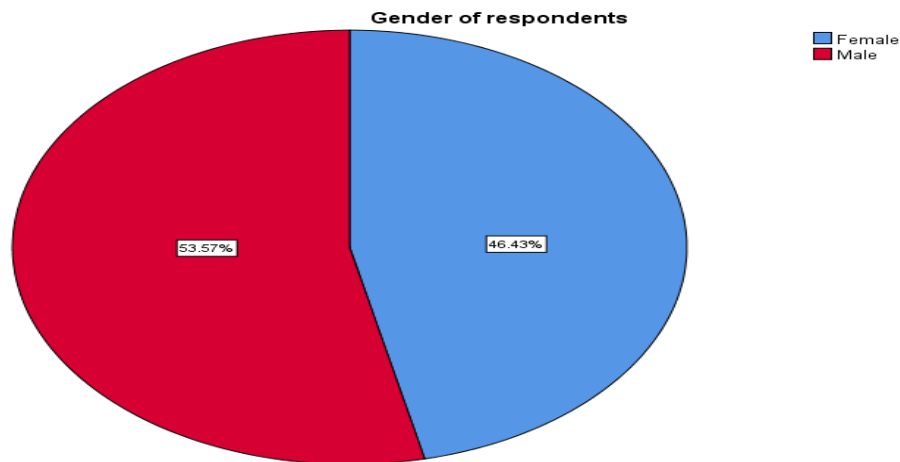


Figure 1: Gender of Respondents

Source: Field study (2020)

Figure 4.1 the results of the study indicate that 53.57% of respondents were males while the remaining 46.43% were females. This indicative of a fair gender balance in terms of the respondents engaged in this present study.

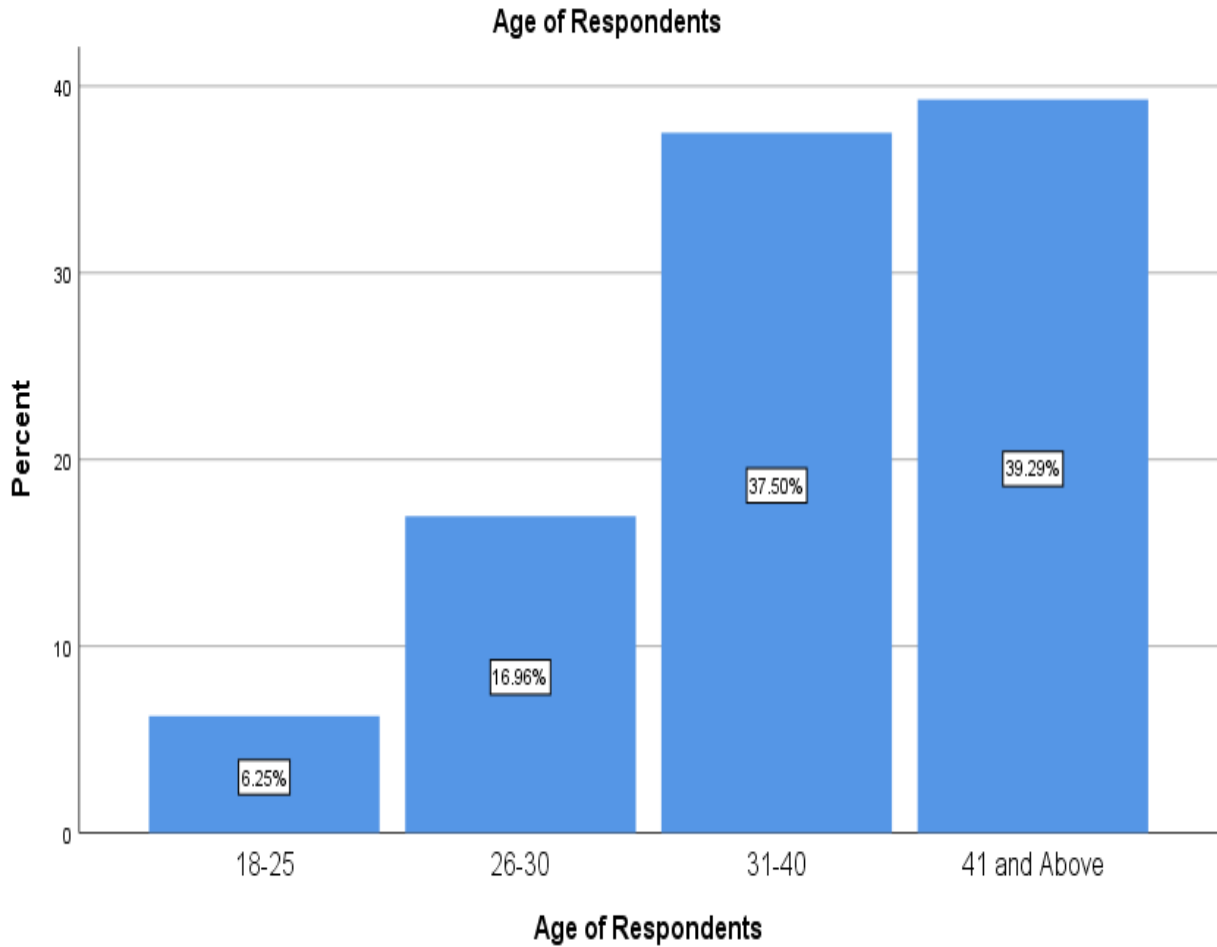


Figure 2: Age of Respondents

Source: Field study (2020)

Figure 2 above illustrated the age distribution of respondents of results of the study. 39.29% of respondents are of the ages of 41 years and above, 37.50% of respondents are between the ages of 31 to 4 years, 16.96% of respondents are between the ages of 26 to 30 years while the remaining 6.25% of the respondents are between the ages of 18 to 25 years.

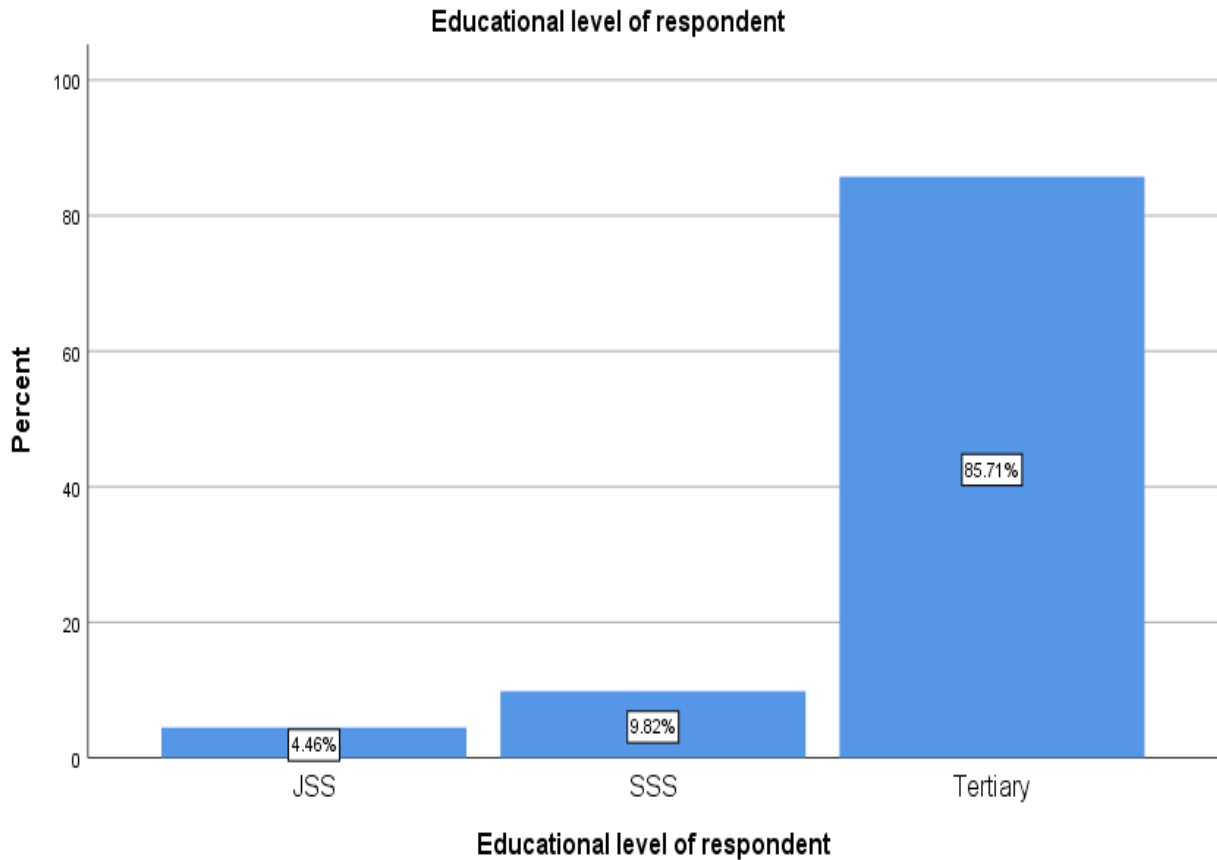


Figure 3: Educational Levels of Respondents

Source: Field Study (2020)

Figure 3 above, revealed that majority (85.71%) of respondents had tertiary education, 9.82% of respondents had senior secondary school (SSS) education, while the remaining 4.46% of respondents had junior secondary school (JSS). This result clearly shows majority of the teachers interviewed in this present study were adequately educated to teach in their respective schools.

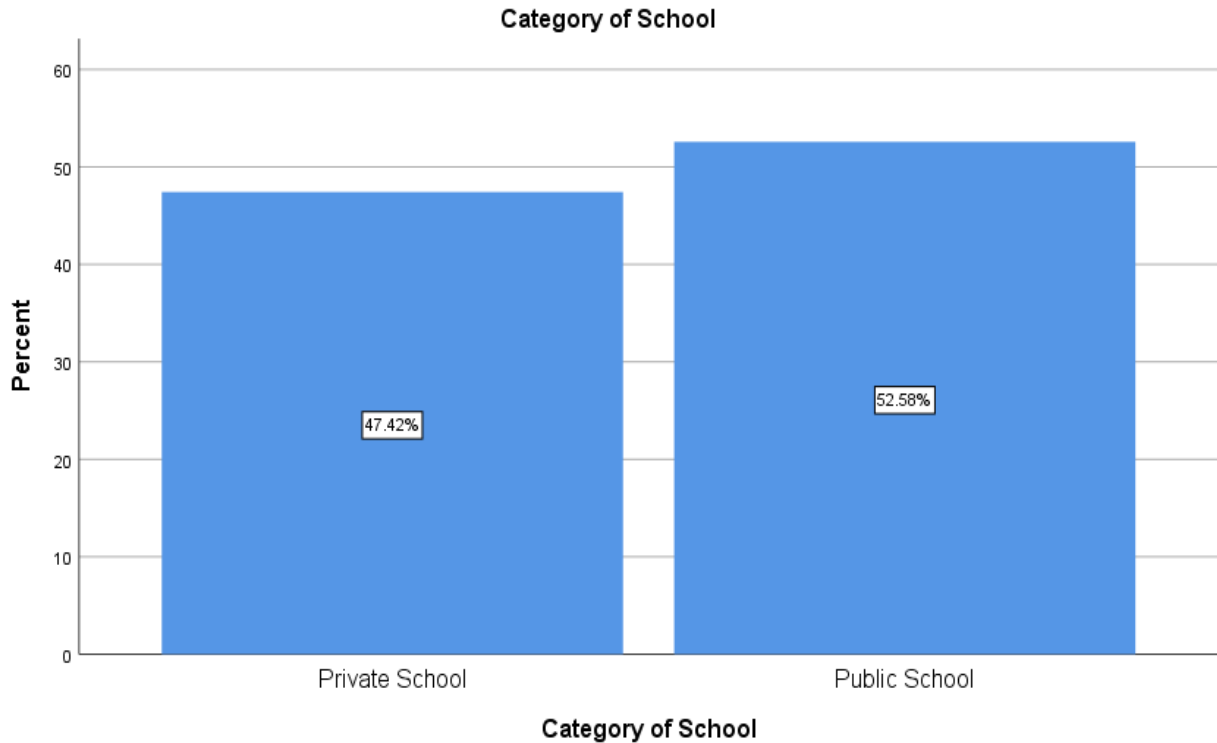


Figure 4: Category of Schools of Respondents

Source: Field Study (2020)

The present study reported that about 66 (52.56%) of respondents are teachers working in the public schools while the remaining 46 (47.42%) represent the teachers working in the private school category.

4.3 Working conditions and work Environment of Teachers (Public vs. Private schools)

This section presents the results obtained from the study in terms of the basic working conditions and the work environments of the schools of the respondents that were engaged for this present study. This section assessed the working conditions and characteristics of the work environment of teachers in line with the concept of ergonomic conditions and situations based on the objective this study. The teacher's salary, number of years in the teaching profession, classroom and teaching characteristics were assessed. The results in this section were comparatively expressed in terms of public schools as against that of private schools in order to identify differences and similarities.

4.3.1 Salary of Respondents (Public vs. Private schools)

The salaries of respondents from private schools and public schools are shown under this section.

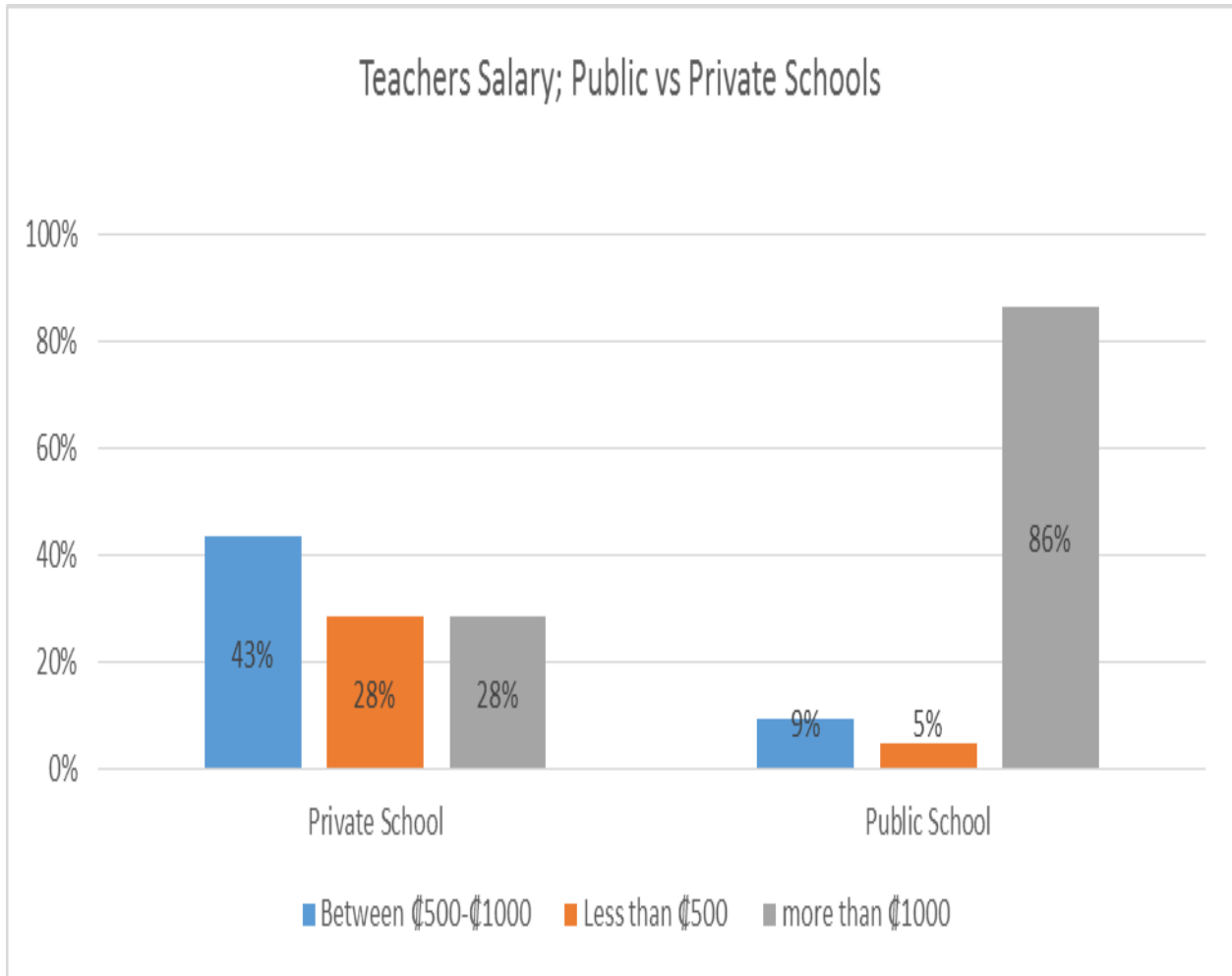


Figure 5: Teachers Salary; Public vs. Private Schools

Source: Field Study (2020)

Figure 7 above, revealed that 43% of teachers from the private schools earn between ₱500-₱1000 per month, 28 earn more than ₱1000 while the remaining 28% earn less than ₱500. In the Public schools, the results shows that 86% of respondents earn more than ₱1000, 9% earn between ₱500-₱1000 per month while the remaining 5% earn less than ₱500. This result shows that respondents from public schools are well paid better than respondents from private schools.

4.3.2 Number of years in the teaching profession of respondents (Public vs. Private schools)

This result shows the number of years respondents have worked in the teaching field.

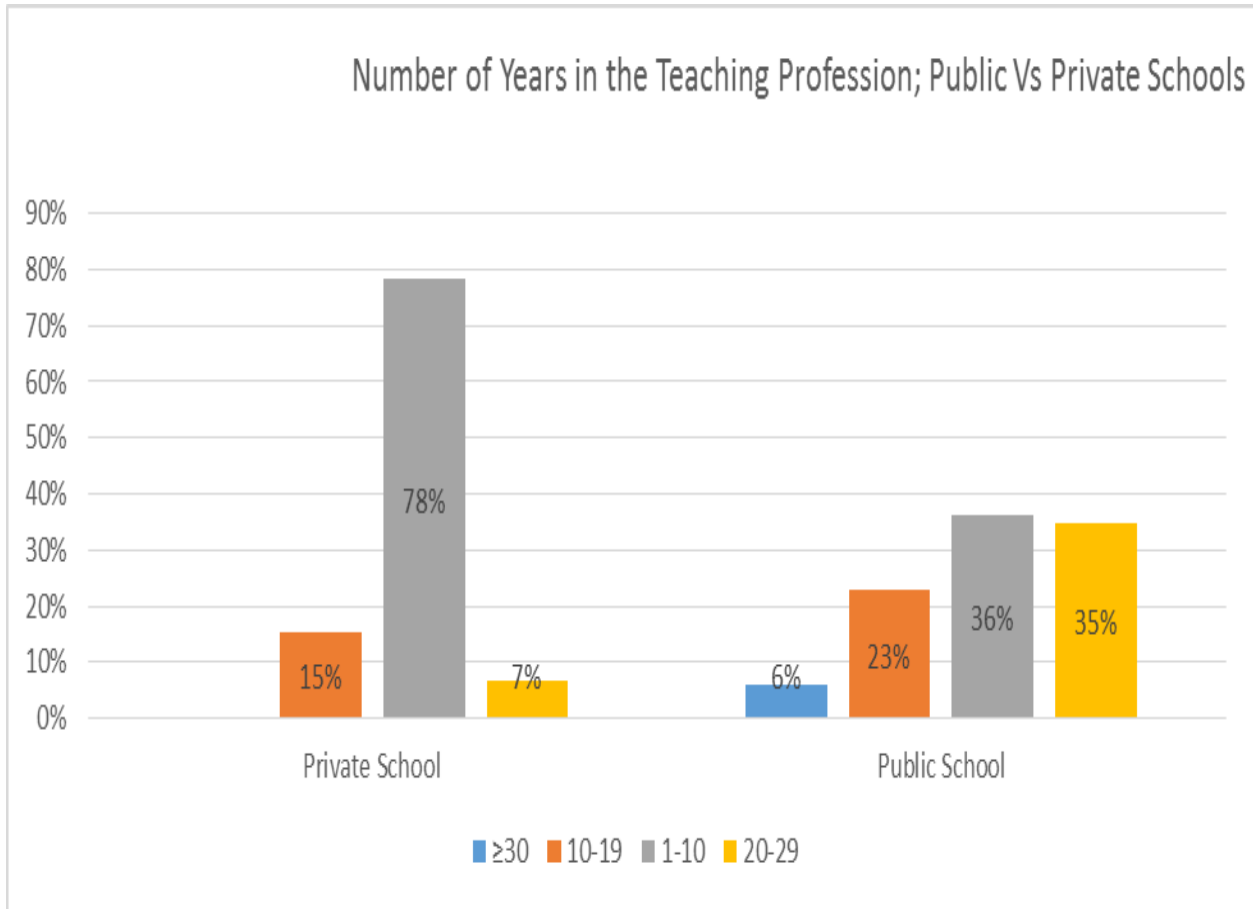


Figure 6: Number of years in the teaching profession; Public vs. Private schools

Source: Field Study (2020)

In terms of respondents' number of years in the teaching profession, the results show that 78% of the private school teachers have been in the teaching profession for 1-10 years, 15% for 10-19 years while 7% for 20-29 years. For public schools, the results show that 36% of respondents have been in the teaching profession between 1-10 years, 35% between 20-29 years, 23% between 10 to 19 years and 6% for 30 or more years. The results show that public school teachers have more work experience than the private school teachers.

4.3.3 Classroom and work load characteristics of respondents (Public vs Private schools)

Under this section, the results below compare the class sizes and other workload characteristics handled by respondents from the two categories of schools

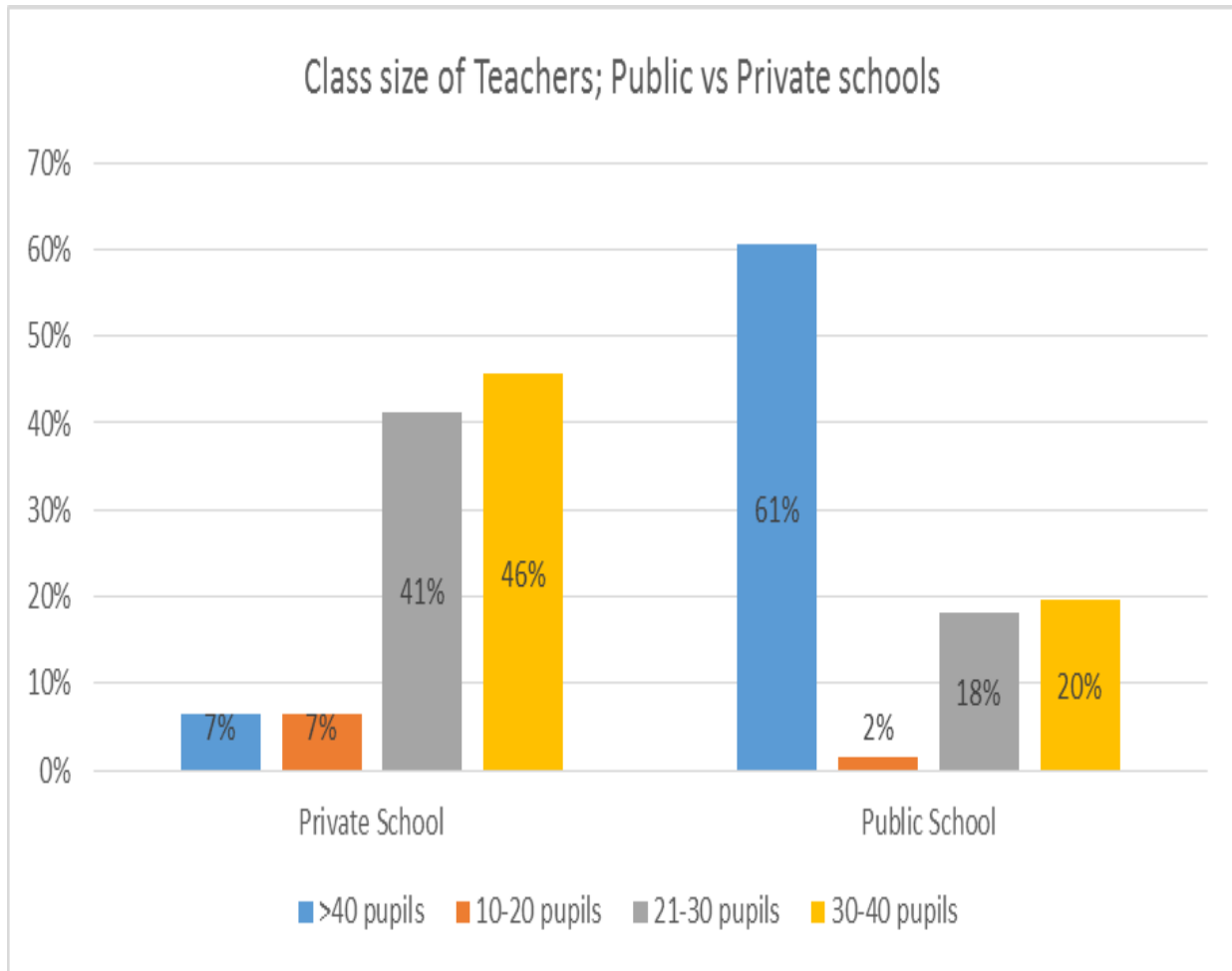


Figure 7: Class size of Teachers; Public vs. Private schools

Source: Field Study (2020)

46% of private school respondents handle a class size between 30 to 40 pupils, 41% handle between 21 to 30 pupils, 7% between 10 to 20 pupils and the remaining 7% handle a class size which is more than 40 pupils. For public schools the results shows that 61% handle a class size of more than 40 pupils, 20% handle a class size between 30 to 40 pupils, 18% handle between 21 to 30 pupils and the remaining 2% handle a class size between 10 to 20 pupils. This result

shows that teachers in the public schools handle a larger class size than those in the private schools. (See Figure 7).

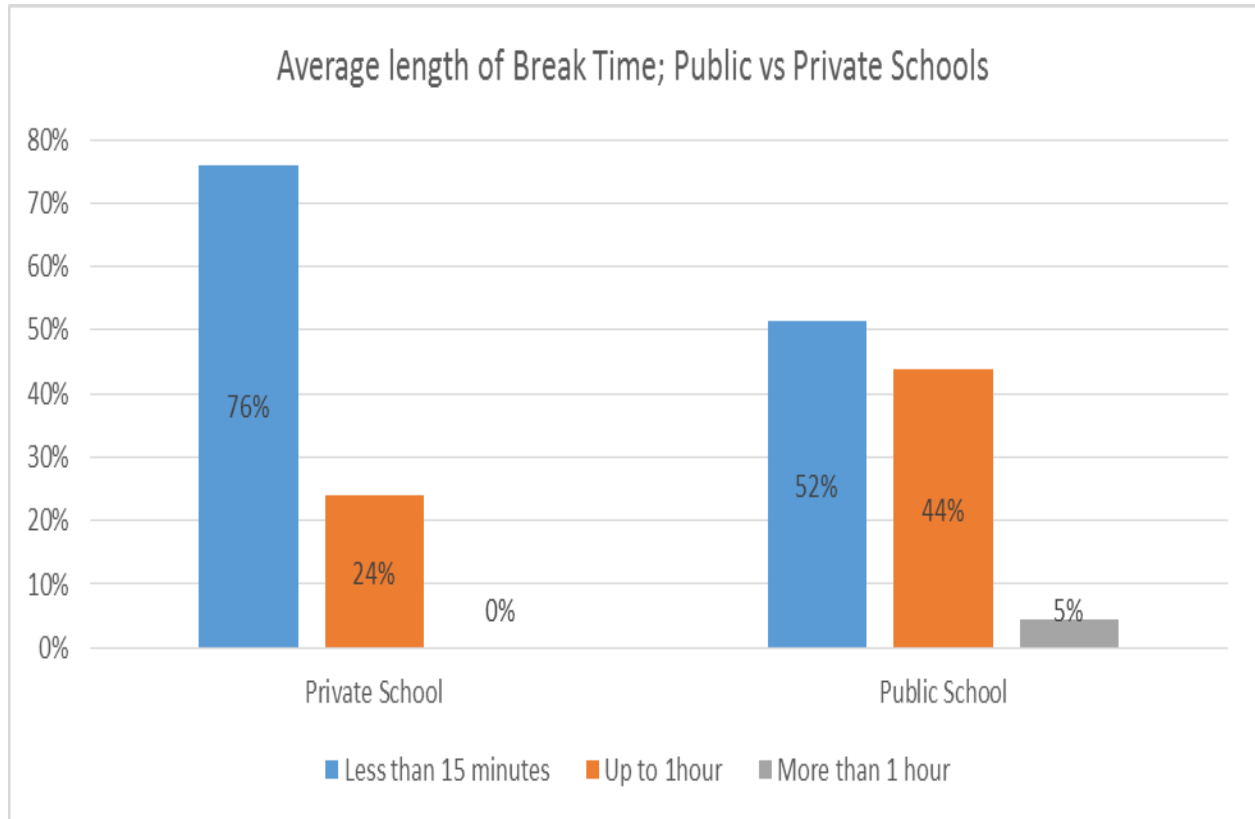


Figure 8: Average length of Break Time; Public vs. Private Schools

Source: Field study (2020)

Figure 8 above, presented the results which shows that 76% of private school respondents have a break time of less than 15 minutes while the remaining 24% have a break time of up to an hour. For public schools 52% have a break time of less than 15 minutes, 44% for up to an hour and the remaining 5% have a break time of more than an hour.

This result implies that the breaking time is slightly shorter (less than 15 minutes) in the private school category than that of the public schools.

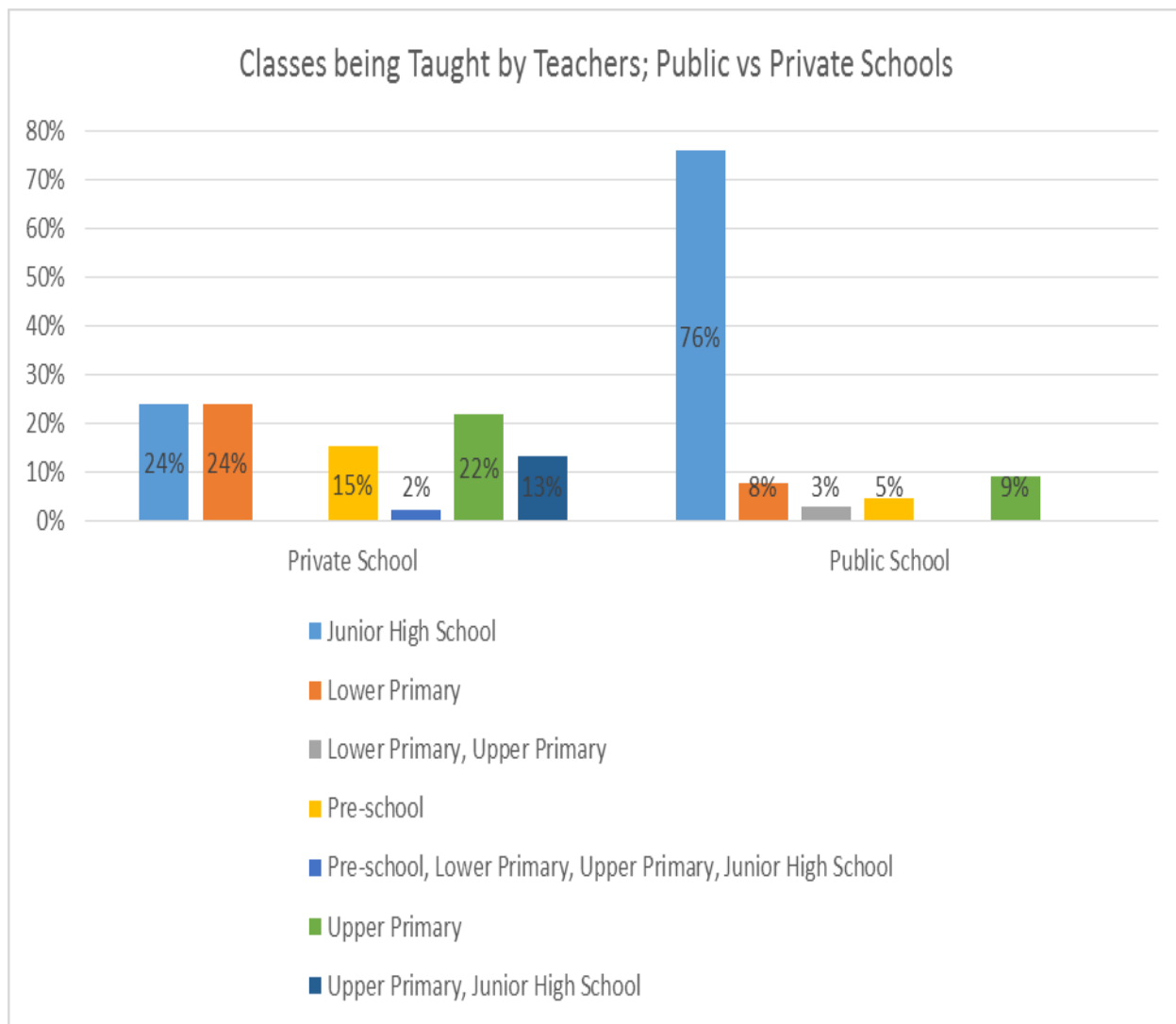


Figure 9: Classes being taught by Teachers; Public vs. Private Schools

Source: Field study (2020)

In terms of the classes handled by respondents, the results from figure 9 revealed that about 24% of private school respondents handle Junior high school, 24% handle lower primary, 22% handle Upper primary, 15% handle Pre-school, 13% handle both Upper primary and Junior high school while 2% teach at all levels from Pre-school to Junior high school. For public schools, 76% of respondents handle Junior high school, 9% handle both Upper primary and Junior high school, 8% handle Lower primary, 5% handle Pre-school while the remaining 3% handle both Lower primary and Upper primary.

Table 6a: Mean Rank -Teaching hours per Week; Public vs. Private Schools

	Which Category of School do you teach currently?	N	Mean Rank	Sum of Ranks
How many hours do you work per week?	Private School	46	51.33	2361.00
	Public School	66	60.11	3967.00
	Total	112		

The result above compares the teaching hours per week between private and public schools. The mean rank for number of teaching hours per week in private schools is 51.33 and that of public schools is 60.11.

Table 6b: Statistical Test - Teaching hours per Week; Public vs. Private Schools

	No. of hours of work per week
Mann-Whitney U	1280.000
Wilcoxon W	2361.000
Z	-1.679
Asymp. Sig. (2-tailed)	.093

a. Grouping Variable: Category of School

Using the Mann-Whitney statistical test, the results from **Table 6b** indicated that there is no statistically significant difference in the number of working hours per week between both categories of schools as the p-value is $0.093 > 0.05$.

4.3.4 Characteristics of Teachers seat and desk (Public vs. Private schools)

The result under this section shows the type and appropriateness of work seat and desks used by respondents from both categories of schools.

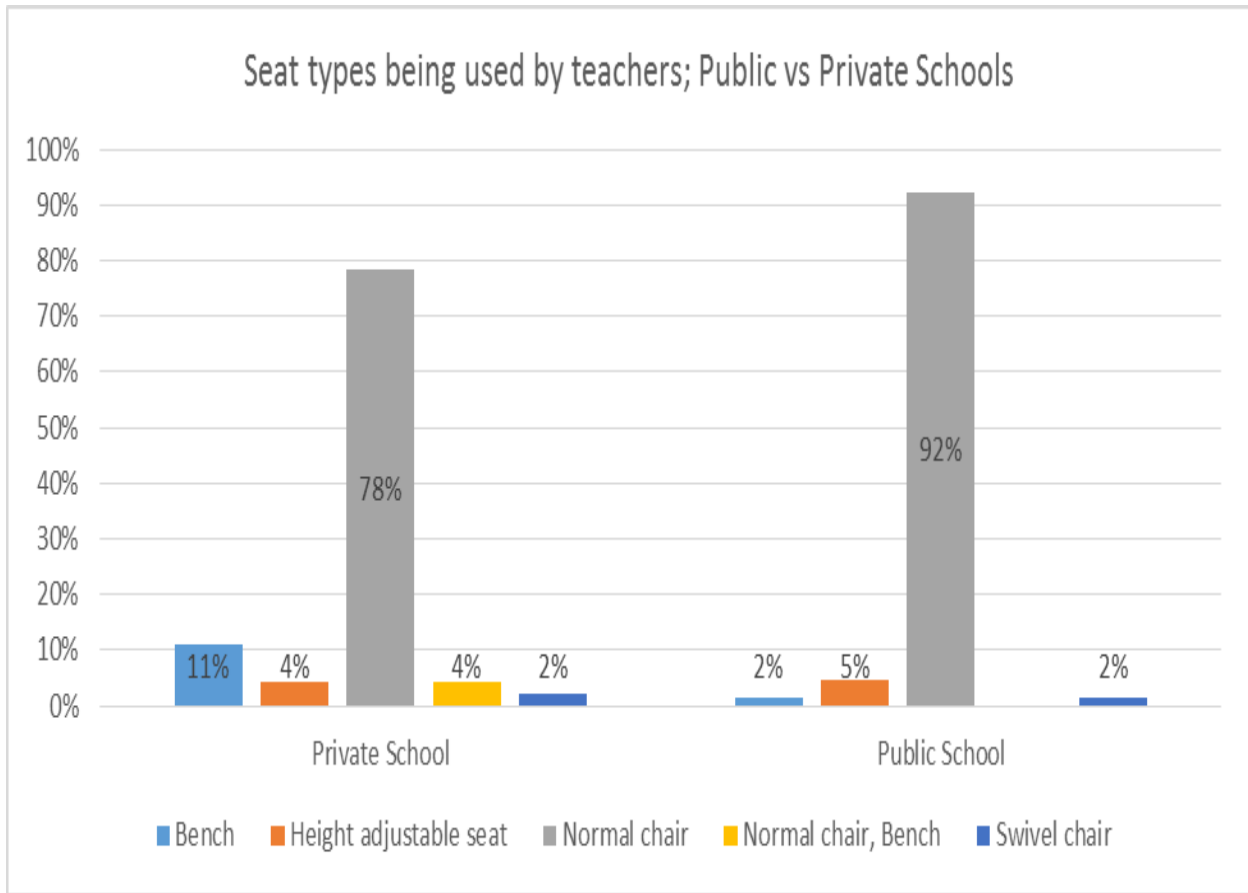


Figure 10: Seat types in use; Public vs. Private Schools

Source: Field Study (2020)

In terms of the type of seat used by respondents in the classroom, the results from Figure 10 revealed that 78% of private school respondents use a normal chair, 11% use a bench, 4% use height adjustable seat, another 4% use both a normal chair and a bench and the remaining 2% use a bench in the classrooms. On the part of the Public schools 92% of respondents use normal chair, 5% use Height adjustable chairs, 2% use a bench while the remaining 1% use a swivel chair. From this account, it has been established that both category of schools mostly use normal chair while less than 6% use height adjustable seats.

Table 7a: Mean Rank- Characteristics of Teachers work seat and desk height; Public vs. Private schools

	Category of School	N	Mean Rank	Sum of Ranks
Appropriateness of your work seat height	Private School	43	64.38	2768.50
	Public School	66	48.89	3226.50
	Total	109		
Appropriate of work desk height	Private School	41	54.68	2242.00
	Public School	66	53.58	3536.00
	Total	107		

Table 7a above is the results of the characteristics of the work seat and desk used by teachers in both schools. Respondents from Private schools had a mean rank of 64.38 for the appropriateness of their work seat height as compared to 48.89 for that of public schools. The mean rank for work desk height of private school respondents is 54.68 and that of public schools is 53.58.

Table 7b: Statistical Test - Characteristics of Teachers work seat and desk height; Public vs. Private schools

	Appropriateness of work seat height	Appropriateness of work desk height
Mann-Whitney U	1015.500	1325.000
Wilcoxon W	3226.500	3536.000
Z	-3.050	-.211
Asymp. Sig. (2-tailed)	.002	.833

a. Grouping Variable: Category of School

In Table 6b above, a p-value of $0.002 < 0.05$ was realized for the appropriateness of work seat height in both schools. This shows there is a statistically significant difference between private schools and public school work seat height used.

A p-value of $0.833 > 0.05$ was realized for the appropriateness of work desk height in both categories of schools. This result however shows that there is no statistically significant difference in the work desk height of private schools and public schools. **(See Table 7b)**

4.3.5 Classroom Black/white board characteristics (Public vs. Private schools)

This section of the results shows the type and appropriateness of the white/black boards used by teachers in both categories of schools.

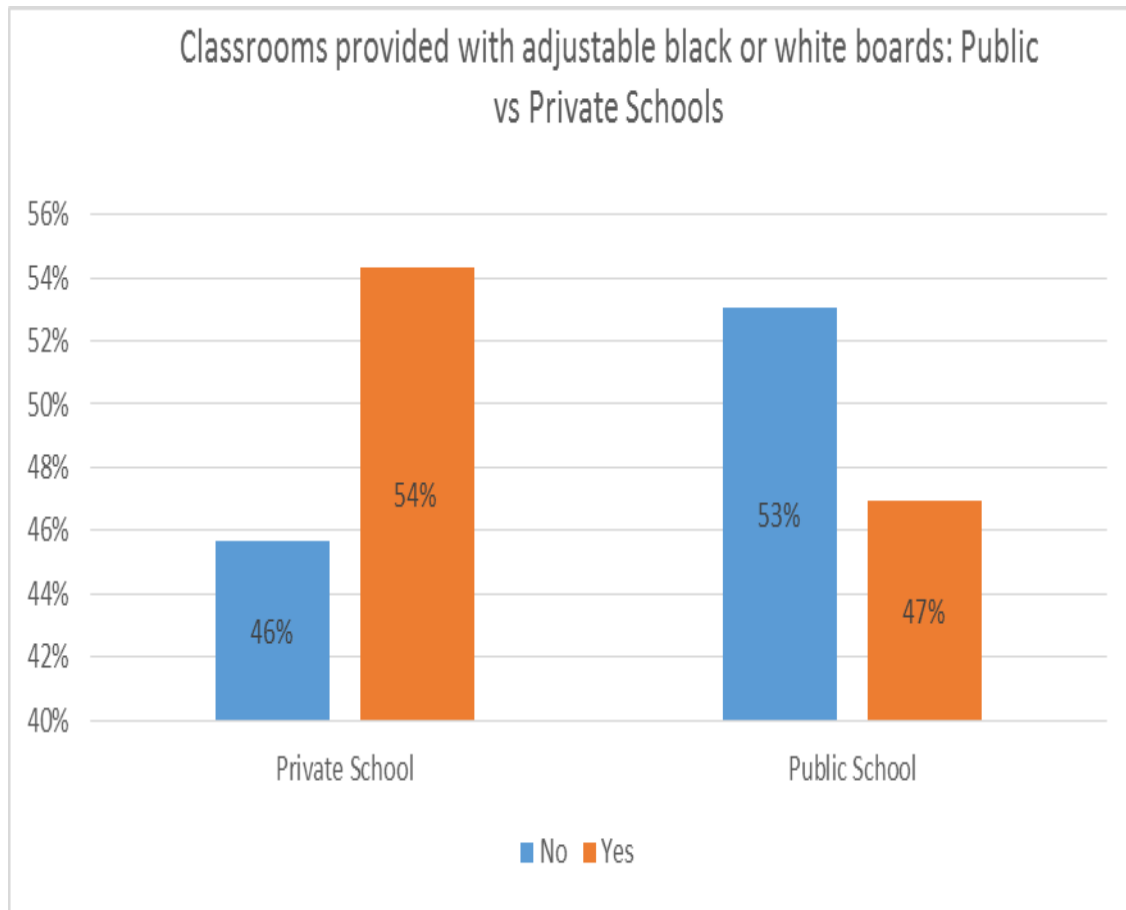


Figure 11: Classrooms provided with adjustable black or white boards; Public vs. Private Schools

From the Figure 11 above, the results obtained in terms of classrooms provided with adjustable black or white boards indicated that 52% of private school respondents have adjustable black or white boards as against 47 % from that of public school respondents.

This implies that more private schools have adjustable black or white boards as compared to public schools.

Table 8a: Mean Rank - Height Appropriateness of black/white board; Public vs. Private Schools

	Category of School	N	Mean Rank	Sum of Ranks
Appropriateness of the white/black board height?	Private School	32	45.13	1444.00
	Public School	46	35.59	1637.00
	Total	78		

The result above compares the mean ranks of private and public schools. A mean rank of 45.13 and 35.59 was realized for private and public schools respectively with regards to the appropriateness of the white/blackboard height used by the respondents. The results indicate that private schools respondents find the height of their white/blackboard more appropriate than those from the public schools.

Table 8b: Statistical Test - Height Appropriateness of black/white board; Public vs. Private Schools

	white/ black board height
Mann-Whitney U	556.000
Wilcoxon W	1637.000
Z	-2.151
Asymp. Sig. (2-tailed)	.031

a. Grouping Variable: Category of School

From the above results, there is a statistically significant difference in the appropriateness of white/blackboard height in both schools as the p-value of $0.031 < 0.05$ was realized (**See Table 7b**).

Table 9a: Mean Rank - Classroom Air quality and Lighting systems (Public vs. Private schools)

	Which Category of School	N	Mean Rank	Sum of Ranks
Level of air quality in the classrooms	Private School	44	54.17	2383.50
	Public School	66	56.39	3721.50
	Total	110		
Lighting of the classrooms	Private School	44	55.02	2421.00
	Public School	66	55.82	3684.00
	Total	110		

From **Table 9a**, the mean rank level of air quality and lighting is revealed. The level of air quality in private school classroom is 54.17 and 56.39 for public schools.

For level of lighting in classrooms, private school had a mean rank of 55.02 and 55.82 for public schools. **See Table 9a**

Table 9b: Statistical Test - Classroom Air quality and Lighting systems (Public vs. Private schools)

	level of air quality in the classroom	lighting of the classrooms
Mann-Whitney U	1393.500	1431.000
Wilcoxon W	2383.500	2421.000
Z	-.369	-.134
Asymp. Sig. (2-tailed)	.712	.894

a. Grouping Variable: Category of School

From the results above, there is no statistically significant difference in the level of air quality in both category of schools as the p-value is $0.712 > 0.05$.

Similarly, there is also no statistical significant difference in the quality of lighting in both categories of schools since the p-value realized is $0.894 > 0.05$. **See Table 9b**

4.3.6 Maintenance of School sanitation and adequacy of sanitation fittings (Public vs. Private schools)

Good sanitation is a one of the major characteristics of a good working environment. The results under this section show how the adequacy and maintenance of sanitation facilities from both schools.

Table 10a: Maintenance and Adequacy of sanitary system in the school; Public vs Private Schools

		Ranks		
	Category of School	N	Mean Rank	Sum of Ranks
Maintenance and adequacy of Sanitary fixtures (toilets, hand wash basin)	Private School	44	58.75	2585.00
	Public School	66	53.33	3520.00
	Total	110		

From Table 10a, the result shows the mean ranks of the maintenance and adequacy of sanitation facilities in both schools. 58.75 and 53.33 were the mean ranks from both private and public schools respectively.

Table 10b: Statistical Test - Maintenance and Adequacy of sanitary system in the school; Public vs. Private Schools

Maintenance and adequacy of sanitary fixture	
Mann-Whitney U	1309.000
Wilcoxon W	3520.000
Z	-1.074
Asymp. Sig. (2-tailed)	.283

a. Grouping Variable: Category of School

There is no statistically significant difference in the maintenance and adequacy of sanitary facilities in both school since the p-value is $0.283 < 0.05$. **See Table 10b**

4.3.7 Health and safety training for Teachers (Public vs. Private schools)

Teachers are exposed to occupational hazards in the course of their work; hence it is essential for teachers to have health and safety training. The results below compare health and safety training in both schools and its significant differences. .

Table 11a: Mean Rank - Health and Safety training for Teachers; Public vs. Private Schools

	Category of School	N	Mean Rank	Sum of Ranks
Have you ever had training on health and safety at work?	Private School	42	49.50	2079.00
	Public School	66	57.68	3807.00
	Total	108		
Are there regular repetitions of the health and safety training	Private School	43	56.01	2408.50
	Public School	66	54.34	3586.50
	Total	109		

Table 11a above shows the mean ranks of health and safety training carried it in both categories of schools and the frequency of the trainings. A mean rank of 49.50 and 57.68 was indicated for both private and public schools respectively. In terms of regular Organisation of health and safety training in both categories of schools, the mean ranks realized were 56.01 for private schools and 54.34 for public schools.

Table 11b: Statistical Test - Health and Safety training for Teachers; Public vs. Private Schools

	Have you ever had training on health and safety at work?	regular repetitions of the health and safety training
Mann-Whitney U	1176.000	1375.500
Wilcoxon W	2079.000	3586.500
Z	-1.555	-.331
Asymp. Sig. (2-tailed)	.120	.741

The p value for health and safety training at work $0.12 > 0.05$ and repetitions of health and safety training is $0.741 > 0.05$. The null hypotheses for both cannot be rejected and therefore we can conclude that there is no statistically significance between private schools and public schools for all the variables. Their respective means confirm it. **See Table 11b**

4.3.8 Respondent's Satisfaction with the work environment (Public vs. Private schools)

The results under this section show respondents satisfaction with their work environment from both categories of schools.

Table 12a: Mean Ranks -Teachers satisfaction with the work environment; Public vs. Private Schools

	Category of School	N	Mean Rank	Sum of Ranks
Satisfied with working environment	Private School	44	54.50	2398.00
	Public School	64	54.50	3488.00
	Total	108		

From the above results, a mean rank of 54.50 was realized for both private and public schools in terms of satisfaction towards working environment. **See Table 12a**

Table 12b: Statistical Test -Teachers satisfaction with the work environment; Public vs. Private Schools

Are you satisfied with your working environment	
Mann-Whitney U	1408.000
Wilcoxon W	3488.000
Z	.000
Asymp. Sig. (2-tailed)	1.000

a. Grouping Variable: Category of School

The results from **Table 12b** show that there is no significant difference between the private school and public schools in terms of satisfaction with their work environment since the p- value is $1 > 0.05$. The null hypotheses cannot be rejected.

4.3.9 Respondent's Suggestion for improvements to their school's work environment

Below are suggestions garnered from respondents towards improvement of their work environment.

- "I think that staff common room can be provided for teachers to rest when it's break or when teacher needs to rest due to some health issue".
- "Division of class into smaller unit and more facilitators recruit"
- "The sitting area for teachers"
- "White board, adequate ventilation, planting grasses or fixing pavement blocks to reduce dust level, etc"
- "The whole facility must be built again"
- "Improve the general sanitation"
- "The classroom floor, lighting system and sanitation"
- "Sanitation, toilet facility, water, classroom space, air and lighting".
- "More classrooms should be built, to control de class size"
- "Ventilation, lighting and sanitation need to be improved"
- "Sanitation should be improved"
- "The risk factors should be minimal"
- "The classroom size"
- "There should be gutters in the school"
- "More space needed"
- "The necessary infrastructure and teaching learning materials including good sanitation could help improve the standard and quality of education in the municipality"
- "The furniture is not enough for the pupil's"
- "There should be improvement on sanitation, ventilation, provision of quality and modernized furniture, incentives and security protocols"
- "There should be enough classrooms and furniture"
- "The seats for teachers should be adjustable and class size should be looked at"
- "Availability of water"
- "Managerial decisions"

- “The seat and ventilation”
- “Toilet facility”
- “There should be a regular health and safety training for the teachers to enable them to be on top of health issues in the school”
- “Too bad because of the market squad”
- “Need comfortable fresh air in the environment” .
- “Infrastructure”
- “Physical infrastructure and sanitation”
- “Condition of school building”
- “supply of textbooks and desks”
- "Large class should be reduced"
- “Ventilation and disposal of refuse”
- “Staff room could be refurbished”
- “facilities and sanitation”
- “Fixtures, desks, seats should be changed”
- “Teachers chairs and desks needs improvement”
- “The building and the facilities”
- “Provision of adjustable chairs”
- “Salary increment”
- “More breaks in between class”
- “Availability of health and safety training”
- “adjustable blackboards”
- “Good ventilation”
- “Good lighting system”
- “Good and adequate sanitary fixtures”
- “proper ventilation”
- “installation of proper sanitary fixtures”
- “adjustable chalk board”
- “Proper Lighting system”
- “Adequate sanitary fixtures”
- “Improve ventilation in the classroom”

From these suggested improvements the following were the salient points obtained from the study;

- Improvement of sanitation and waste management in the schools
- Provision of adequate teaching materials
- Provision of adequate furniture(Desk and seat) for teachers
- Provision of adjustable white or black writing boards
- Classroom space should match class size
- Reduction in class size
- Improvement in the facilities and infrastructure in the schools
- There should be regular Health and safety training for teachers
- Improvement in Ventilation systems in the schools
- Improvement in Lighting system
- More breaking time to allow for some rest during the day
- Improvement in Salaries and incentives for teachers particularly for teachers in the private schools as the results showed they are the least paid in comparison with their counterpart from the public schools

4.4 Assessment of Health Status of Teachers (Public vs. Private schools)

This section of the data analysis reviews the results obtained in terms of the health status of respondents in connection with work environment where they work. This includes both the psychological and physical wellbeing of their health in line with the objectives of this study.

4.4.1 Emotional health status of respondents (Public vs. Private schools)

This section shows the results of the emotional health status of respondents from both categories of schools.

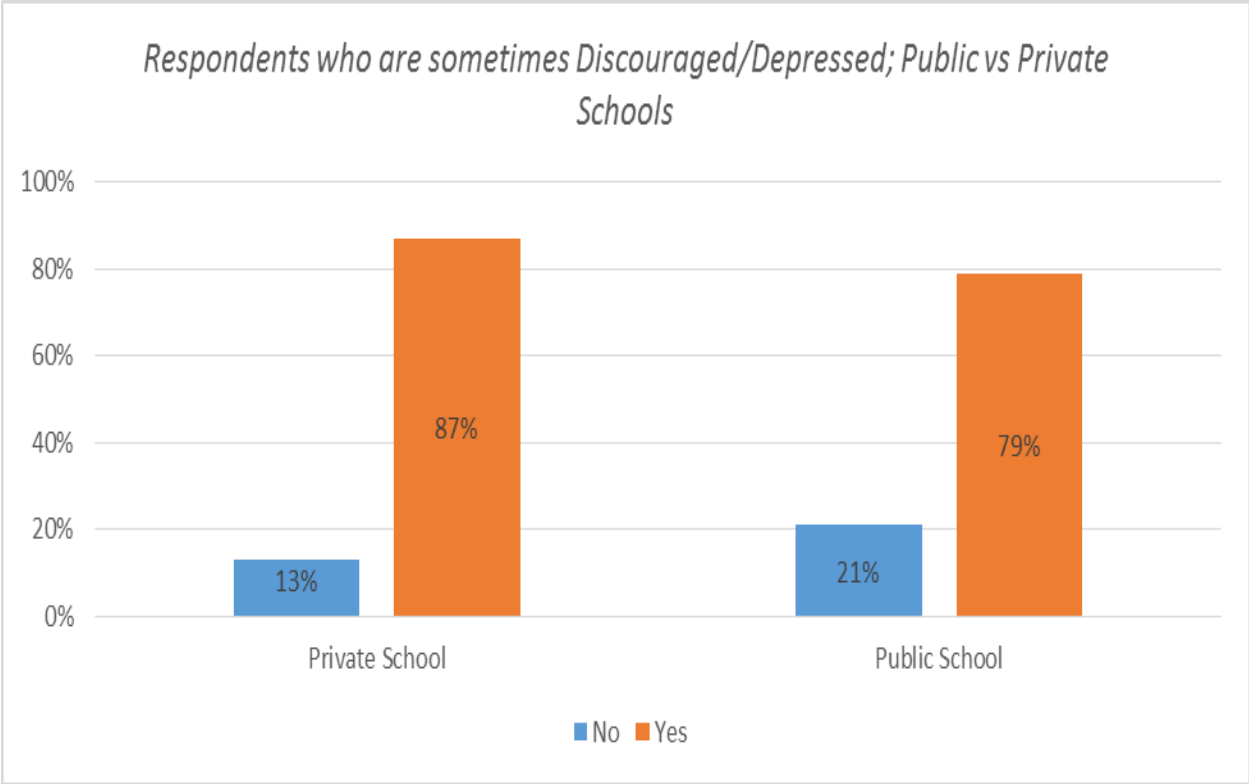


Figure 12: Respondents who are sometimes Discouraged/ Depressed; Public vs Private Schools

Source: Field study (2020)

Figure 12 above, illustrated the results obtained in terms of respondents who are sometime feeling discouraged or depressed are as follows; about 87% of private school respondents indicated they feel discouraged or depressed as compared to 79% of Public school respondents. This result shows that respondents from private schools feel more discouraged or depressed than public school respondents.

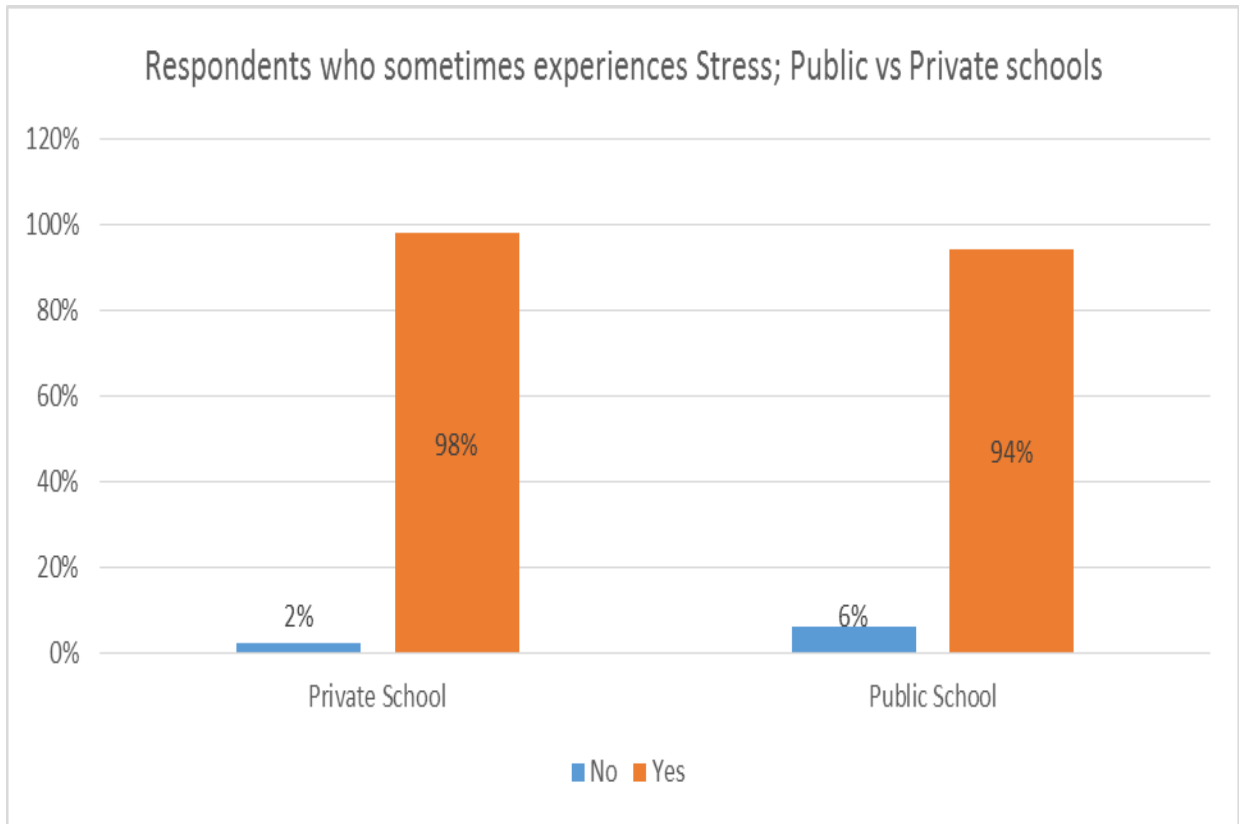


Figure 13: Teachers who sometimes experiences Stress; Public vs. Private schools

Source: Field study (2020)

The results obtained in terms of respondents who are sometime experiences stress are as follows; on the part of private schools, 98% of respondents indicated they sometimes experience stress whiles 2% do not experience stress. For Public schools, 94% of respondents indicated they experience stress while the remaining 6% do not experience stress. The results from the present study therefore imply that public school respondents experience more stress than private school respondents.

4.4.2 Physical health status of respondents (Public vs. Private schools)

Table 13a: Mean Ranks -Teachers Health status; Public vs. Private Schools

	Category of school	N	Mean Rank	Sum of Ranks
Neck Pain	Private School	43	66.57	2862.50
	Public School	65	46.52	3023.50
	Total	108		
Shoulder Pain	Private School	43	63.08	2712.50
	Public School	62	46.01	2852.50
	Total	105		
Lower back pain	Private School	42	57.98	2435.00
	Public School	65	51.43	3343.00
	Total	107		
Upper back pain	Private School	44	62.53	2751.50
	Public School	66	50.81	3353.50
	Total	110		
Wrist pain	Private School	41	61.18	2508.50
	Public School	62	45.93	2847.50
	Total	103		
Knee Pain	Private School	41	64.77	2655.50
	Public School	65	46.39	3015.50
	Total	106		
Ankle Pain	Private School	40	65.53	2621.00
	Public School	65	45.29	2944.00
	Total	105		

Table 13a above shows the mean ranks of Work related musculoskeletal disorders experienced by respondents from both categories of schools in the last 12 months prior to the study.

Table 13b: Statistical Test -Teachers Health status; Public vs. Private

	Neck Pain	Shoulder Pain	Lower back pain	Upper back pain	Wrist pain	Knee Pain	Ankle Pain
Mann-Whitney U	878.500	899.500	1198.000	1142.500	894.500	870.500	799.000
Wilcoxon W	3023.500	2852.500	3343.000	3353.500	2847.500	3015.500	2944.000
Z	-3.353	-2.887	-1.085	-1.926	-2.597	-3.094	-3.523
Asymp. Sig. (2-tailed)	.001	.004	.278	.054	.009	.002	.000

a. Grouping Variable: Category of school

Since the p-value of the neck pain is $0.001 < 0.05$, shoulder pain is $0.004 < 0.05$, upper back pain is $0.054 < 0.05$, wrist pain is $0.009 < 0.05$, knee pain is $0.002 < 0.05$ and ankle pain is $0.000 < 0.05$, we reject the null hypotheses for all of them and conclude there is a statistically significant difference between Private school and public schools for all.

However, since the p-value for lower back pain is $0.278 > 0.05$, we do not reject the null hypothesis and therefore there is no statistically significant difference between private school and public school for lower back pain. **See Table 13b**

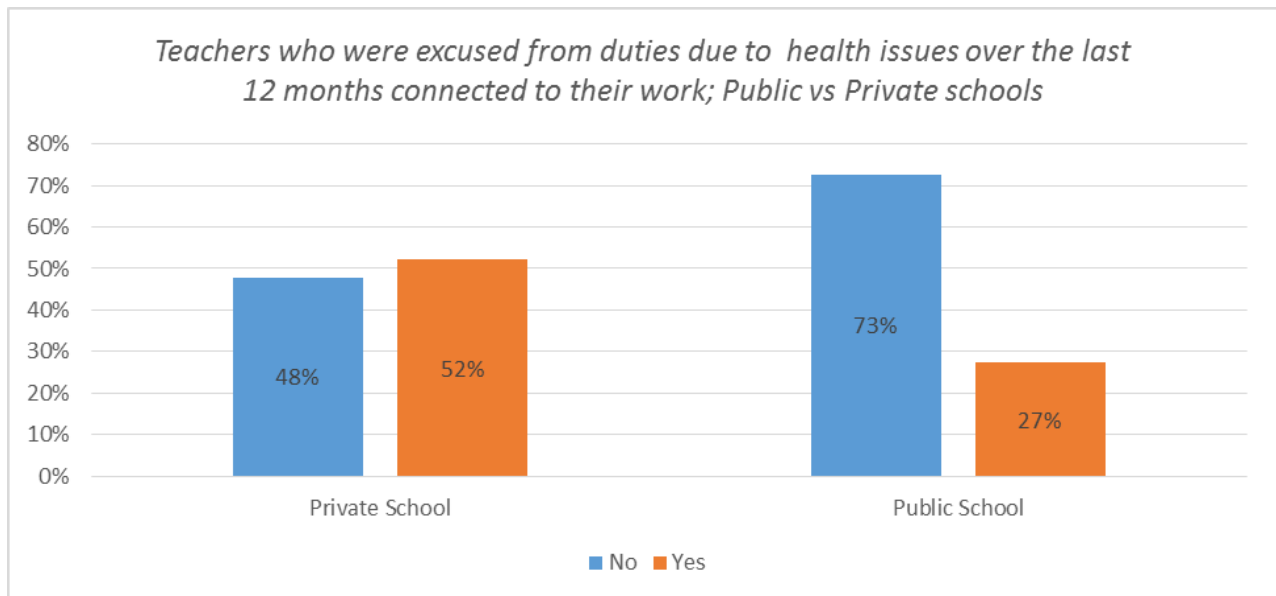


Figure 14: Teachers who were excused from duties due to health issues over the last 12 months connected to their work; Public vs. Private schools

From the Figure 14 above, the results obtained in terms of the respondents who had excused duty due to ill health connected to their work over the last 12 months is as follows;

On the part of private schools, 52% of respondents indicated they had excuse duty due to ill health in connection to their work while 48% did not have excuse duty due to ill health in connection to their work.. For public schools, 27% of respondents were excused from duty due to ill health in connection to their work over the last 12 months while 73% indicated they did not have excuse duty due to ill health which is in connection with their work. The results therefore imply that majority of respondents from private schools had excuse duty due to ill health in connection with their work as compared to respondents from public schools.

4.5 Impact of Ergonomic on the Wellbeing of respondents (Statistical Test of relationship; Public vs. Private schools)

In order to draw a relation between ergonomic situations in the schools of respondents of the study and its impacts on their wellbeing in line with the objectives of this study, the Pearson correlation test was used. It was used to establish the degree of associations or the relationship between the dependent variable (Wellbeing) and independent variable (Ergonomics).

Table 14: Impact of ergonomics on the wellbeing of teachers-(Private Schools)

		Ergonomics	Wellbeing
Ergonomics	Pearson Correlation	1	.458**
	Sig. (2-tailed)		.001
	N	46	46
Wellbeing	Pearson Correlation	.458**	1
	Sig. (2-tailed)	.001	
	N	46	46

** . Correlation is significant at the 0.01 level (2-tailed).

The Pearson Correlation analysis in **Table 14** above, show that there is about 45.8% influence or impact of ergonomics situations on the wellbeing of teachers from the private schools ($r=0.458$), This relationship was found to be statistically significant at 1% ($p=0.001<0.01$) and therefore does support H_A/H_1 .

Table 15 : Impact of ergonomics on the wellbeing of teachers-Public Schools

		Ergonomics	Wellbeing
Ergonomics	Pearson Correlation	1	.518**
	Sig. (2-tailed)		.000
	N	66	66
Wellbeing	Pearson Correlation	.518**	1
	Sig. (2-tailed)	.000	
	N	66	66

** . Correlation is significant at the 0.01 level (2-tailed).

Table 15 above, the results show about 51.8% influence of ergonomics situations on wellbeing ($r=0.518$), hence there is a 51.8% impact of Ergonomics on the wellbeing of teachers in the public schools. This relationship was found to be statistically significant at 1% ($p=0.00<0.01$) and therefore does support HA/H1.

4.6 Hypotheses Test of Results; Public vs. Private schools

Relating the statistical test results in Table 4.4A and 4.4B above to the Hypotheses of the study below were the outcomes

Table 16: Hypotheses test outcomes

Hypotheses	Decision (Supported/Unsupported)
(Hn/HO): The ergonomic situation in the work place of teachers in private and public school does not affect the wellbeing of teachers	Unsupported
(HA/H1): The ergonomic situations in the workplace of teachers in the private and public schools affects the wellbeing of teachers	Supported

Based on findings as suggested by the correlation analysis as displayed in **Table 14,15** and **Table 16** above, proved that the null hypotheses of the study was not supported in both category of schools (private vs. Public schools). However, the degree of the relation is higher at the public schools than in the case of the private schools.

4.7 DISCUSSION OF RESULTS

In assessing the impact of ergonomic situations on the wellbeing of Teachers in basic public and private schools of the Awutu Senya East Municipal of the Central Region of Ghana several observations were made.

One of the objectives of this study is to compare the ergonomic situations of private and public schools in the Awutu Senya Eat Municipal. The Mann-Whitney U statistical test carried out indicated that there was a difference in the statistical significance of teachers' work seat height and white/ black board height when both categories of schools were compared. Musculoskeletal disorders such as neck, shoulder, upper back, wrist, knee and ankle pains, with the exception of lower back pain were also significantly different for both schools.

Variables such as teaching hours per week, work desk height, air and lighting quality were found not to be significantly different. Similarly, the difference in sanitation facilities, satisfaction of work environment and health and safety training were found not to be statistically significant for both schools.

The result obtained from the study according to the Pearson Correlation analysis on the influence of ergonomic situations on the wellbeing of teachers indicated that ergonomic situations impact the wellbeing of teachers by 51.8% in the public basic schools as against 45.8% in the private basic schools. The present study revealed that majority of respondents in both public and private schools, sometimes they feel stressed and discouraged or even depressed. One of the factors that could be attributed to this is the long working hours by respondents from both categories of schools. The present study result shows that 72% of private school respondents and 56% of public school respondents' work up to 40 hours in a week. 28%, 44% of respondents from private schools and public schools work more than 40 hours respectively. A study carried out by Shields(1999) shows that working more than 34 hours per week increased the chance of experiencing depression and work stress(Shields, 1999) which goes in line with this present study.

In addition, the ergonomic situation in the work environment of both schools could play a role in the physical health status of the respondents. The study revealed that over the past 12 months, prior to the conduct of the respondents from both schools experienced mild to moderate neck pain, shoulder pain, lower back pain, upper back pain, write/hand pain, knees pain and ankle pains. The absenteeism among teachers from both categories of schools as shown in the results of the present study could be associated with the musculoskeletal disorders reported by these respondents. This goes in line with previous studies where prevalence of musculoskeletal disorders reported in the neck and upper extremities but also in back and lower extremities were found to be associated with teacher absenteeism(Erick & Smith, 2011).

A major limitation of the study is the exclusion of risk factors that explain these MSDs. Factors such as working conditions under which the teachers perform their work could explain the presence of specific musculoskeletal disorders. For each region of the body, MSD can be a consequence of the significant use of repeated physical activities, like writing on a blackboard/white board or marking of assignments for several hours or 'head down' posture, during reading.[(Bogaert et al., 2016; Chiu & Lam, 2007). Long hours standing while teaching(Abdulmonem et al., 2014), postural overloads in the classroom, uncomfortable back support while seated, recurrent twisting, and prolonged static postures could also be a factor to these (Yue et al., 2012).

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

In conclusion, there is indeed a positive correlation between ergonomic situations on the wellbeing of teachers in both public and private basic schools in Ghana although the degree of the relation is higher at the public basic schools than in the case of the private schools.

5.2 Recommendations

The study will make the following policy recommendations for implementation in public and basic schools in Ghana in line with the subject of ergonomics in the work environment.

- In addressing the serious issue of Musculoskeletal disorders (MSD) in the teaching profession, ergonomics training specific to MSD risk factors and prevention should now be introduced into teachers' training institutions, while refresher courses relating to the work tasks and workstations of teachers should also be introduced for in-service teachers.
- There is the need to ensure a suitable class size and contact hours per lesson per week for every teacher basic schools especially in the public schools.
- There is the need to allow for more breaking time in basic schools above the less than 15 minutes to enable teachers to have adequate rest during the breaking time
- Teachers should be provided with suitable seat and desk with appropriate height of the seat, backrest height of seat, backrest inclination, backrest curvature, depth of the seat, width of the seat and height of the work desk.
- Public basic schools should install suitable adjustable black or white boards in the classroom to in view of its implication on the health of teachers.
- There is the need to ensure the highest air quality in the classroom, ensure provision of adequate lighting system and sanitation fixtures in place in the schools,
- There is the need to continue to conduct regular health and safety training for teacher especially in the private basic schools.
- There is the need for improvement of waste management, facilities and infrastructure and improvement in Salaries and incentives for teachers particularly for teachers in the private schools.

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APPENDIX

IMAGES



1. A picture of Public Schools Black/White Board from the research area.



2. A picture of the Private School Green chalk Board from the research area



3. A picture of a Public schools teacher's work desk and chair from the research area



4. A picture of a Private schools teacher's desk and chair from the research area



5. A picture of a Private schools toilet facility from the research area



6. A picture of Public schools toilet facility from the research area



7. A picture of the Building structure of one of the private schools in the research area



8. A picture of the Building Structure of a Public school in the research area

QUESTIONNAIRE

QUESTIONNAIRE FOR THE ASSESSMENT OF THE ERGONOMIC SITUATION AND OCCUPATIONAL HEALTH OF TEACHERS IN PUBLIC AND PRIVATE SCHOOL OF THE AWUTU SENYA EAST MUNICIPAL OF THE CENTRAL REGION OF GHANA.

I am studying Master of Public Health at the Hamburg University of Applied Sciences, Germany. I am currently carrying out my Master's thesis on the topic, 'Assessing the ergonomic situation and occupational health of teachers in public and private school of the Awutu Senya East Municipal of the Central Region of Ghana'.

I humbly request for your assistance in participating in this survey. The survey will take 15minutes to fill this questionnaire. Participation in this research study is highly valued but voluntary and your information provided will be strictly confidential and used solely for the purpose of the study.

Thank you for your cooperation in the conduct of this study. I wish you all the best in your work and future experiences.

Best Regards,

Nana Yaa Afrah Amoakohene

*Required

PART A (PERSONAL PROFILE)

Directions: Please provide the following information by filling in the data yourself or by ticking that which corresponds to your response

1. Gender *

Mark only one

- a. Female
- b. Male

2. Age * _____

3. Educational level *

Mark only one

- a. Junior Secondary School level
- b. Senior Secondary level
- c. Tertiary level
- d. Other:

4. Which Category of School do you teach currently? *

Mark only one.

- a. Private School
- b. Public School

5. Which class do you teach?(multiple answers possible) *

Tick all that apply.

- a. Pre-school
- b. Lower Primary
- c. Upper Primary
- d. Junior High School

6. What is the average class size you teach?(pupil teacher ratio) *

Mark only one.

- a. 10-20 pupils
- b. 21-30 pupils
- c. 30-40 pupils
- d. >40 pupils

7. Monthly Salary *

Mark only one.

- a. Less than ₱500
- b. Between ₱500-₱1000
- c. more than ₱1000

PART B – WORKING ENVIRONMENT

8. How many years have you spent in the teaching profession? *

Mark only one oval.

- a. 1-9
- b. 10-19
- c. 20-29
- d. ≥30

9. How many hours do you work per week? *

Mark only one.

- a. ≤ 40 hours
- b. ≥ 40 hours

10. How many hours per lesson do you teach per week? *

Mark only one.

- a. ≤14

b. >14

11. What is the average length of breaking time between lessons? *

Mark only one.

- a. Less than 15 minutes
- b. Up to 1hour
- c. More than 1 hour

12. Do you have more than 1 hour of prolonged standing at work?

Mark only one.

- a. Yes
- b. No

13. Do you have more than 1 hour of prolonged sitting at work?

Mark only one oval.

- a. Yes
- b. No

If NO skip to question 15

14. If yes, what are the reasons for prolonged sitting? (multiple answers possible)

Tick all that apply.

- a. For exam marking
- b. For assignment marking

Other:

15. What type of seat do you use frequently at work? (multiple answers possible)

Tick all that apply.

- a. Height adjustable seat
- b. Swivel chair
- c. Normal chair
- d. Bench

16. How appropriate is your work seat height?

Mark only one..

- a. Just right
- b. Too high
- c. Too low

17. How appropriate is your work seat backrest height?

Mark only one.

- a. Just right
- b. Too high
- c. Too low

18. How appropriate is your seat backrest inclination?

Mark only one.

- a. Just right
- b. Too backward
- c. Too forward

19. How appropriate is your seat backrest curvature?

Mark only one.

- a. Just right
- b. Too curved
- c. Too flat

20. How appropriate is the depth of your work seat?

Mark only one.

- a. Just right
- b. Too deep
- c. Too narrow

21. How appropriate is the width of your work seat?

Mark only one.

- a. Just Right
- b. Too wide
- c. Too narrow

22. How appropriate is your work desk height?

Mark only one.

- a. Just right
- b. Too high
- c. Too low

23. Do you use adjustable white or blackboards in the classrooms?

Mark only one oval.

- a. Yes
- b. No

If YES please skip the next question

24. How appropriate is the classroom white/ black board height?

Mark only one.

- a. Just right
- b. Too high
- c. Too low

25. Do you find the level of air quality in the classroom very clean and motivating to work?

Mark only one.

- a. Strongly disagree
- b. Disagree
- c. Neutral
- d. Agree
- e. Strongly agree

26. Do you find the lighting of the classrooms and office to be excellent when working?

Mark only one.

- a. Strongly disagree
- b. Disagree
- c. Neutral
- d. Agree
- e. Strongly agree

27. Are sanitary fixtures (toilets, hand wash basin) in the school very well maintained and enough for all?

Mark only one.

- a. Yes
- b. No

28. Have you ever had training on health and safety at work?

Mark only one.

- a. Yes
- b. No

29. Are there regular repetitions of the health and safety training (eg annually or every 2-3 years)?

Mark only one.

- a. Yes
- b. No

30. Are you satisfied with your working environment?

Mark only one.

- a. Yes
- b. No

31. If No what could be improved?

32. Are you sometimes or often discouraged and depressed ?

Mark only one.

- a. Yes
- b. No

33. Do you sometimes or often have stress?

Mark only one.

- a. Yes
- b. No

PART C- HEALTH STATUS

34. Have you at any time within the past 12 months had trouble such as ache, pain, discomfort, numbness in any of the parts of your body stated below? 0 means "no trouble", 1 "very low trouble" ... up to 5 "very high trouble".

Tick where it applies.

	0	1	2	3	4	5
Neck						
Shoulders						
Lower back pain						
Upper back pain						
Wrist						
One or both knees						
One or both ankles						
Neck						
Shoulders						
Lower back pain						
Upper back pain						

Wrist						
One or both knees						
One or both ankles						

35. In your opinion, was the health problem caused or worsened by the job?

Mark only one.

- a. Yes
- b. No

36. During the last 12 months have you been prevented from doing your normal activities due to this or these troubles?

Mark only one.

- a. Yes
- b. No