

SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA

PREVALENCE OF MUSCULOSKELETAL DISORDERS AMONG
COMMERCIAL LONG DISTANCE BUS DRIVERS IN
THE GREATER ACCRA REGION, GHANA

BY

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(10507001)

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DEGREE

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DECLARATION

I, Mohammed Shaban Osumanu, declare that except for the citing of other people's investigations which have been duly acknowledged, this work is the result of my own original research, and that this dissertation, either in whole or in part has not been presented elsewhere for another degree.

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DEDICATION

This project work is dedicated to my late father Alhaji Osumanu Iddrisu and the entire Iddrisu Sika family.



ACKNOWLEDGEMENT

All praises and thanks to the Almighty Allah, the most merciful and beneficent who enabled me to complete and present this research work in the midst of many adversities. This study would not have come to fruition without the help of many key individuals.

I am truly grateful to my academic supervisor, Dr. John Arko-Mensah for his immense patience, candour, responsiveness, valuable comments, support and encouragement that led to the production of this useful work. I am so lucky to have him as my supervisor.

It is with great admiration that I offer my gratitude and respect to all my lecturers at the School of Public Health, and the members of the dissertation committee for their kind approval of the topic for my dissertation who in diverse ways made my stay at the School a memorable one, not forgetting Mrs. Hannah Tawiah Agbodza the administrator at the Department of Biological, Environmental and Occupational Health Sciences for her selfless support and encouragement given to me at all times.

I extend my deepest regards and profound gratitude to management of VIP Bus Services for granting me permission to carry out the research.

Lastly, my thanks are extended to all those not mentioned in person, participants and who contributed in any way during this research. I wish all of them a long and prosperous life.

ABSTRACT

Musculoskeletal disorders (MSDs) are a diverse range of medical conditions that can result in inflammatory and degenerative conditions of the bones, tissues, tendons, joints, blood vessels and surrounding peripheral nerves. Less than 10% of MSDs cases have an identifiable cause or can be directly attributed to a primary event. Commercial long distance bus drivers provide a critically important service in any society by transporting a large number of people across country. Unfortunately, these drivers by the nature of their work, usually are faced with a myriad of MSDs as a consequence of prolonged sitting, constrained body position, continual repetition of movements, poor postures, force concentrated on small parts of the body such as the hand/wrist, feet and other non-driving related individual factors such as smoking. There is therefore, the need for a comprehensive data on MSDs among Commercial Long Distance Bus Drivers (CLDBDs) and the possible impact on driver performance in the Greater Accra Region.

The aim of this study was to determine the prevalence of MSDs among CLDBDs in Greater Accra Region.

A cross-sectional study was used to explore individual, physical and psychosocial factors that influence the development of MSDs amongst CLDBDs using a semi-structured questionnaire and modified Nordic questionnaire. Data was entered in MS Excel and transported to SPSS version 16.0 for analysis. Further statistical analysis such as chi-square test of independence and fitting of a multinomial logistic regression model and analysis of variance (ANOVA) was performed to explore the association between the risk factors and MSDs.

Overall, 32% and 23% of the respondents complained of upper back and neck pain respectively; with 22% and 21% reporting on lower back and shoulder pains. The least prevalent MSD was pains in the wrist/hand (2.2%) while none of the respondents complained of symptoms, pain or discomfort in the elbows, hips/thighs, knees and ankles/feet. These results present a picture of the prevalence of MSDs or symptoms of the disorder among the drivers studied. The age mostly affected was those from 40 years and above and those who have been involved in commercial long distance driving for 6 years or longer. There was an association between drivers aged 40 to 49 years and shoulder pain. The most common forms of treatment method sought by those who reported pains, discomfort was through the adoption of self-medication and use of herbal medicine.

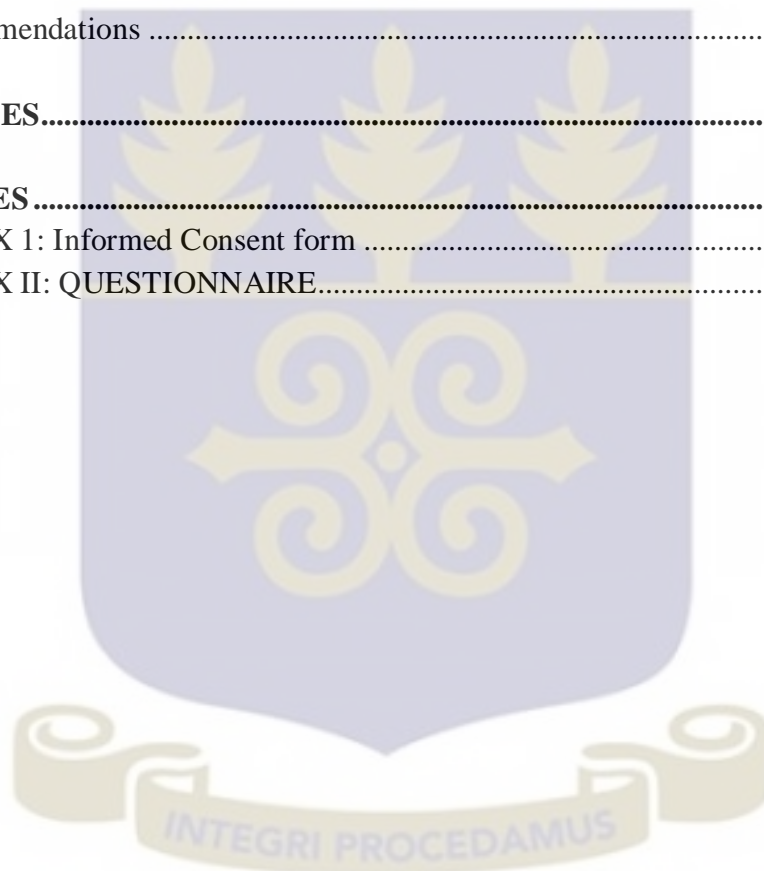
Majority of the CLDBDs who cover over 500km had experienced one form of MSDs or the other with the most affected body parts being upper back, neck, lower back and shoulder respectively with the wrist/hand being the least affected. The results warrant further investigations with a larger sample to ascertain the musculoskeletal disorders among commercial long distance bus drivers.

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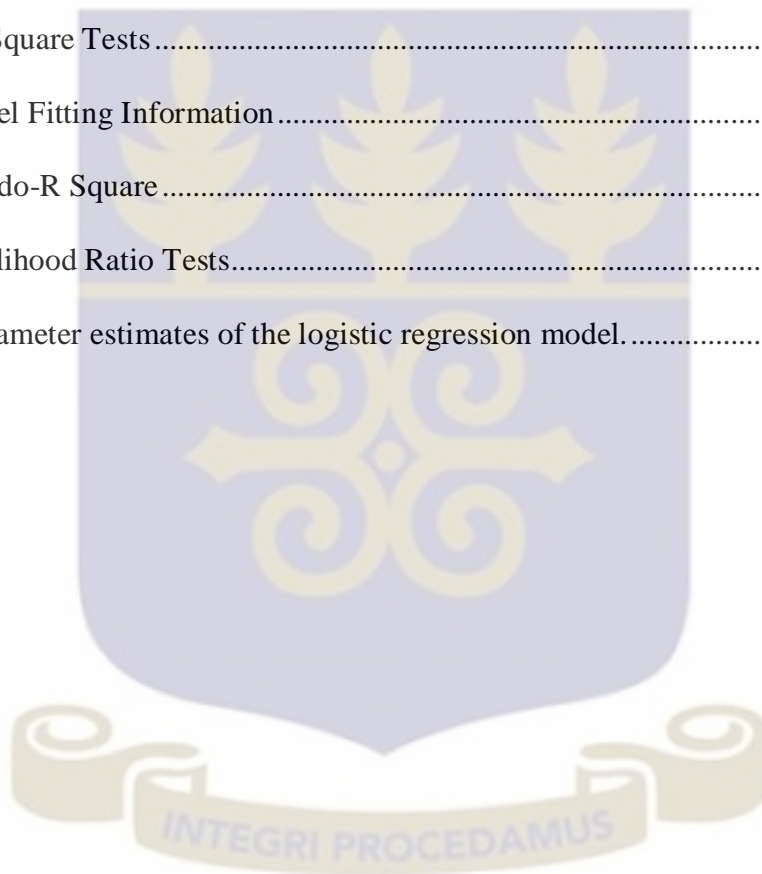
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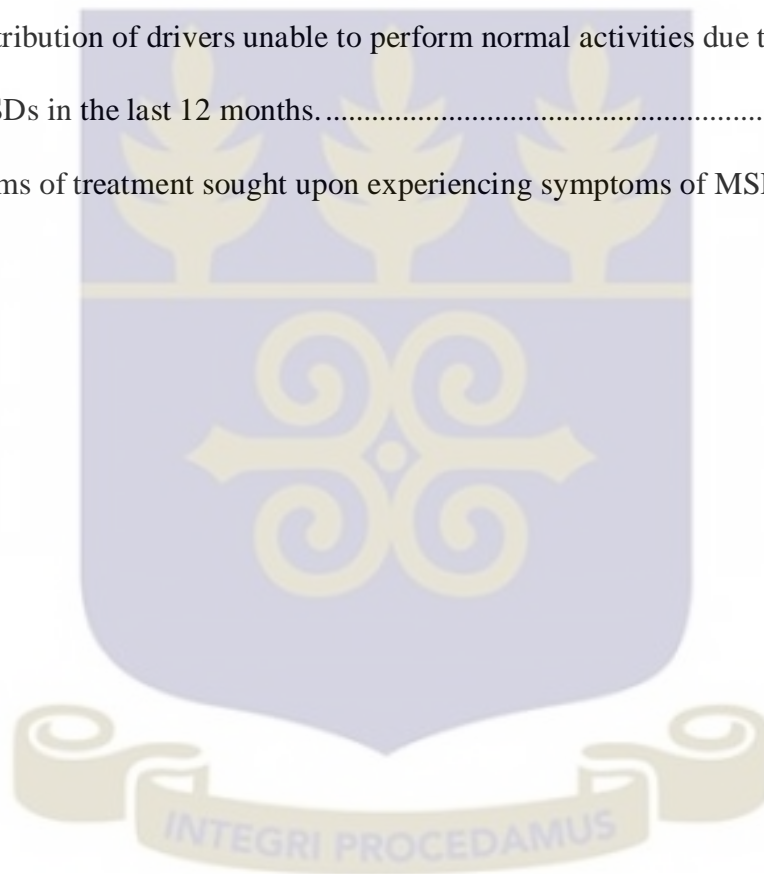
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LIST OF ABBREVIATIONS

CLDBDs	Commercial Long Distance Bus Drivers
MSDs	Musculoskeletal Disorders
WRMSDs	Work-related Musculoskeletal Disorders
LBP	Low Back Pain
UBP	Upper Back Pain
WBV	Whole body Vibration
WHO	World Health Organization
ILO	International Labour Organization
NICE	National Institute for health and care excellence



DEFINITION OF TERMS

Prevalence: It is the proportion of a population who have (or had) a specific characteristic in a given time period – in medicine, typically an illness, a condition, or a risk factor such as depression or smoking.

- prevalence is calculated if one has information on the characteristics of the entire population of interest (this is rare in medicine).
- prevalence is estimated if one has information on samples of the population of interest.

Musculoskeletal disorders: Are injuries or pain in the body's joints, ligaments, muscles, nerves, tendons, and structures that support limbs, neck and back.

Commercial long distance bus drivers (CLDBDs): Commercial long distance bus drivers are professional drivers who travel a distance of 140km or more on a regular basis.

Lower back pain: This can be caused by problems with the spinal muscles, nerves, bones, discs or tendons.

Neck pain: Neck pain is a discomfort in any of the structures in the neck these include the muscles, nerves, bones (vertebrae), and the disks between the bones.

Upper back pain: Upper back pain may be triggered by a specific event, such as improper lifting, bending, or twisting motion, or from poor conditioning (muscle strengthen/torn) and overuse.

Whole body vibration: Is a generic term used where any vibration of any frequency is transferred to the human body. Vibration training on the other hand is a discipline where varying frequencies/amplitudes/forces will be transferred into separate body parts using precise joint angles for any limited time (approximately 1 minute sets).

Ergonomics Risk factors: Ergonomic risk factors are the synergistic elements of MSD hazards.

Electromyography (Emg): Is a technique for evaluating and recording the electrical activity produced by skeletal muscles. EMG is performed using an instrument called an electromyograph, to produce a record called an electromyogram.

Nerve conduction velocity: Is an important aspect of nerve conduction studies and it is the speed at which an electrochemical impulse propagates down a neural pathway.

International Labour Organization: Is a United Nations agency that deals with labour issues, particularly international labour standards and decent work for all.

World Health Organization: Is a specialized agency of the United Nations (UN) that is concerned with international public health.

NICE: A health care agency in the UK that provides clinical guidelines which are systematically developed recommendations on how health care and other professionals should care for people with specific conditions.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Musculoskeletal disorders (MSDs) are a diverse range of medical conditions that can result in inflammatory and degenerative conditions of the bones, tissues, tendons, joints, blood vessel and surrounding peripheral nerves (Punnett & Wegman, 2004). Since MSDs are multi-causal in nature, they can present challenges in clinical diagnoses in the absence of a single specific causative factor. It has been suggested by empirical studies that less than 10% of MSDs have an identifiable cause or can be directly attributed to MSDs symptom (Smedley, Dick and Sadhra, 2013). Similarly, MSDs are arguably the most common cause of occupational morbidity globally affecting individuals of all ages, sexes, socio economic classes and ethnicities (World Health Organization, 2003).

Musculoskeletal disorders vary from back pain to rheumatoid arthritis and gout, and include different types of arthritis, tendinitis and musculoskeletal pain. Musculoskeletal disorders are episodes which are highly prevalent and associated with all racial groups (Felson, 2000). Disorders of the musculoskeletal system are a single largest group of work-related illness and a leading cause of pain, suffering, and disability in many workplaces in both developed and developing countries (Punnett & Wegman, 2004). There are clearly associations between certain occupations and specific MSDs. For example, lower back pain has often been associated with professional drivers such as CLDBDs as a result of prolonged exposure to whole body vibration forces (Waters et al., 2011). An existing correlation between whole body vibration and MSDs was shown to have association with lower back pain amongst drivers (Seidel & Heide, 1986). Pain is the most common symptom of most MSDs, which usually ranges from mild to severe and from acute and short-lived to chronic, and of long duration, and may be local or widespread. Symptoms of MSDs may appear as a result of

acute pain or discomfort following an activity, or improper posture or as a result of intense physical exertion to which the person is unaccustomed to and result in strain, sprain or other biomechanical restriction. Since MSDs have a gradual onset in most cases, the individual may not be able to attribute the eminent pain he or she is encountering or experiencing to a specific immediate activity.

As in the case with many workplace environmental health issues, work related MSDs are difficult to define within traditional disease classifications, and also not always possible to establish a direct cause and effect relationship (WHO, 2005). The case of MSDs particularly lower back pain (LBP) tends to cause more severe negative effect leading to physical pain and morbidity. According to (Punnett et al., 2005), the prevalence of work related LBP was reported to be 37% of the total global MSDs burden equating to 818,000 disability adjusted life years lost. Individuals describing higher levels of job stress, inadequate time to complete their work, poor safety climate in the workplace, lack of work freedom, and low job satisfaction in a national survey also reported higher rates of upper extremity and low back pain (Waters et al., 2011). According to a survey conducted for the general UK population found current smokers 20-50% more likely to report musculoskeletal pain that limited activity as compared to lifetime non-smokers (Palmer et al., 2002).

Globally, workers suffering from musculoskeletal pain at any part of the body region scored lower on quality of life testing than those without pain, a relationship that remained significant even after adjusting for socio-demographic factors (McDonald et al., 2011).

Significant association between physical as well as psychosocial factors and the development of MSDs has been established (Harcombe et al., 2010). The study also recognized that the demographic factors such as age and gender influenced an individual's risks of MSDs.

In the course or during work related processes, there are exertions of load which impact on the musculoskeletal systems externally/ internally or directly/indirectly due to the mass of body segments. The rate of responses in the muscles, ligaments and joint surfaces produce adaptation effects or potentially harmful effects. These probable effects are proportional to the magnitude of the load and other individual, occupational (organizational) or social factors. Some of these adaptation effects include strength, fitness or conditioning. Potentially harmful effects include structural damage to tendons, muscles nerves, joints or supporting tissues that may result in impairment, disability or limitation to work.

The phenomenon and occurrence of MSDs basically depends on a job's physical demands as well as organizational and psychosocial and individual factors (Estill et al., 2002). Numerous publications have been kept on work related MSDs in varied occupations in the past and their findings have underpinned to the formation of the conceptual frame work of risk factors contributing to the development of MSDs.

1.2 Statement of the Problem

Commercial long distance bus drivers provide a critically important service in the society by transporting a large number of people across the country. Unfortunately, these drivers by the nature of their work, usually are faced with a myriad of MSDs due to prolonged sitting, constrained body position, continual repetition of movements, poor postures, force concentrated on small parts of the body such as the hand/wrist, feet and other non- driving related individual factors such as smoking.

In Ghana, several vehicular accidents involving large capacity buses have been attributed to driver fatigue and other job related ailments or conditions such as MSDs. Notwithstanding this knowledge and general sentiments expressed by stakeholders within the transportation sector, there is no comprehensive data on MSDs and their impact on driver performance

including possible road accidents and morbidities. There is therefore, the need for a comprehensive data on MSDs burden associated with CLDBDs and the extent of association between demographic factors and the MSDs pain /discomfort that these drivers are exposed to in their day to day work.

1.3 Conceptual Framework

The model below explains the three principal risk factors that may lead to the risk of MSDs among CLDBDs.

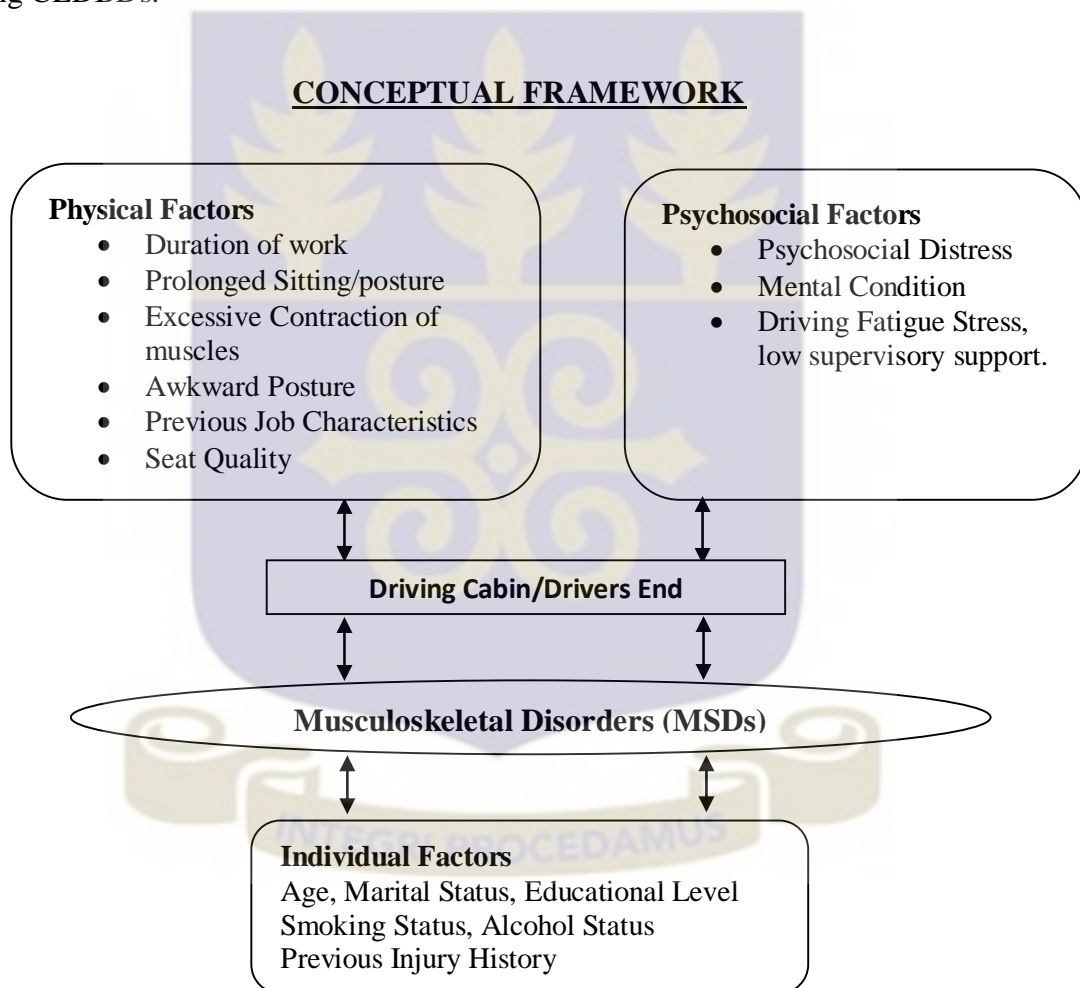


Figure 1: Conceptual Framework of Musculoskeletal disorders

The above framework depicts the relationship between MSDs and the three associated groups of risk factors which tend to influence or predisposes CLDBDs to MSDs pain, discomfort or symptoms. Any one of the risk factors or combination of any two of the risk

factors can cause MSDs among CLDBDs. These risk factors are the individual (lifestyle), physical and psychosocial factors.

Individual risk factors include Age, Marital Status, Educational Level, Smoking Status, and Alcohol Status.

Physical Factors comprise of Duration of work, Prolonged Sitting/posture, Excessive Contraction of muscles, Awkward Posture and Previous Job Characteristics.

Psychosocial Factors on the other hand is made up of Psychosocial Distress, Mental Energy Driving Fatigue (Stress), extended uninterrupted driving periods, and frequency of job problems, high psychosocial demands, high job dissatisfaction, and low supervisory support among others.

1.4 Study Justification

Commercial long distance bus drivers are key players in the transport industry in Ghana, and their work involves sitting for long hours behind the wheel in confined spaces. This could make them particularly prone to MSDs. There is paucity of data on MSDs among different categories of workers in Ghana, including CLDBDs. For example, Bio et al., (2007) in their study on LBP in underground gold miners in Ghana revealed that prevalence was significantly associated with increasing age. The current study aims at bridging the research gap in this MSDs by assessing prevalence amongst CLDBDs.

1.5 Objectives

1.5.1 General objective

To assess the prevalence of musculoskeletal disorders among commercial long distance bus drivers in Greater Accra region.

1.5.2 Specific objectives

- ❖ To determine the factors that influence the prevalence of musculoskeletal disorders among commercial long distance bus drivers in Greater Accra.
- ❖ To determine the effect of physical and psychosocial factors on MSDs amongst CLDBDs.
- ❖ To determine the association between demographic characteristics and musculoskeletal disorders among commercial long distance bus drivers.



CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

Commercial long distance bus drivers (CLDBDs) are mostly professional drivers who usually cover a geographical distance of 140 km or more on a regular basis as defined and contained in a document by the Ghana Metro Mass Transit (Ghana Metro Mass Transit, 2010). Commercial long distance bus drivers by the nature of their routine operations, either leave home at dawn or early in the morning only to return late or spend some days outside the Greater Accra Region depending on the distance or mileage of travel. As a result of their long distance of coverage, CLDBDs are predisposed to the following traits- irregular sleeping habits, confinement to small spaces, prolonged sitting, stress and fatigue. These traits exhibited by these CLDBDs lead to the onset of symptoms associated with MSDs. Furthermore, these CLDBDs are physically inactive since their work is more sedentary and most of them do not make any effort to exercise when not working (Kurosaka et al, 2000; Kompier, 1996).

2.2 Musculoskeletal disorders

Musculoskeletal disorders (MSDs) are simply a type of pain that affects the muscles, ligaments, tendons, and bones. MSDs arise from arm and hand movements such as bending, straightening, gripping, and holding, twisting, clenching and reaching. According to Lorusso et al., (2009), many epidemiological studies have shown that ergonomic factors and aspects of work organization play an important role in the development of these disorders.

Ordinary and common movements are not particularly harmful in the cause of normal work activities. What makes them hazardous in work situations is the continual repetition, often in a forceful manner, and most of all, the speed of the movements and the lack of time for recovery between them. MSDs are associated with work patterns that include:

- Fixed or constrained body positions.
- Continual repetition of movements.
- Force concentrated on small parts of the body, such as the hand or wrist.
- A pace of work that does not allow sufficient recovery between movements

Generally, none of these factors acts separately to cause MSDs. Musculoskeletal disorders commonly occur as a result of a combination and interaction among them. Heat, cold and vibration also contribute to the development of MSDs. The major domains of the human body that is susceptible to MSDs are as follows; Lower back pain, upper back pain, neck pain, shoulder pain, knee pain, hip/thigh pain, elbow pain, ankle/feet pain and wrist pain respectively.

2.3 Aetiology and symptoms of musculoskeletal disorders

The causes of MSDs are varied and multi-faceted and these can be looked at in two key perspectives. There are the Biomechanical (Ergonomics or physical factors) and Non-Biomechanical factors. Muscle tissue can be damaged with the wear and tear of daily activities. Trauma to an area such as jerking movements, auto accidents, falls, fractures, sprains, dislocations, and direct blows to the muscle can also cause musculoskeletal pain. Other causes of pain include postural strain, repetitive movements, overuse, and prolonged immobilization. Changes in posture or poor body mechanics may bring about spinal alignment problems and muscle shortening, therefore causing other muscles to be misused and become painful. Pain is the most common symptom associated with work related MSDs. In some cases there may be joint stiffness, muscle tightness, redness and swelling of the affected area. Some workers may also experience sensations of "pins and needles," numbness, skin colour changes, and decreased sweating of the hands. Work Related Musculoskeletal Disorders (WRMSDs) may progress in stages from mild to severe.

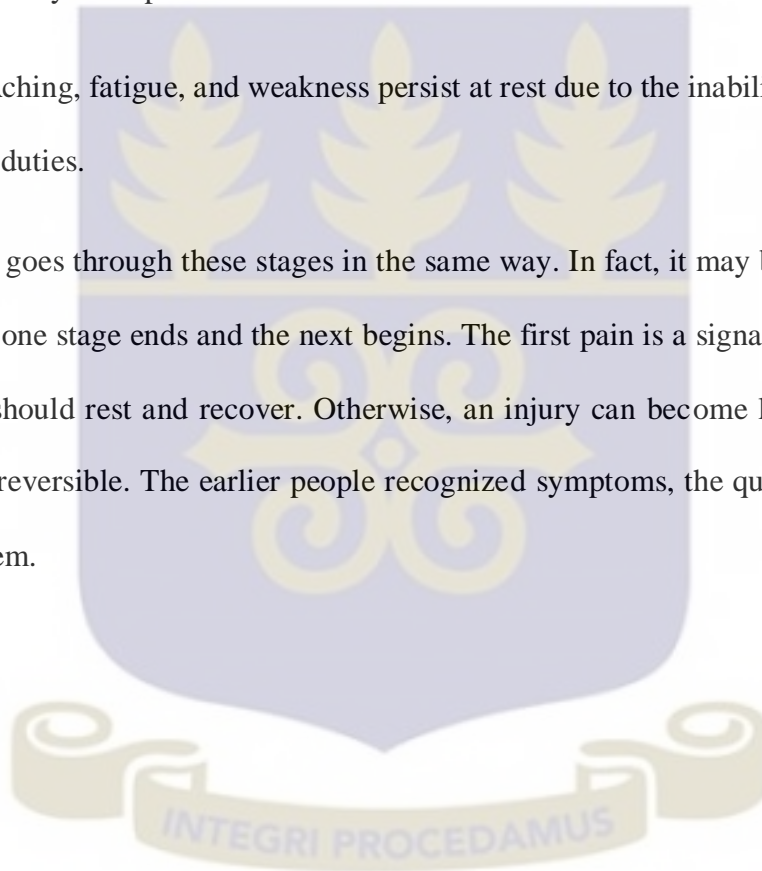
Musculoskeletal disorders present themselves in different stages as Early stage, Intermediate stage and Late stage with each stage associated with manifestation of pain at particular times.

Early stage: Aching and tiredness of the affected limb occur during the work shift but disappear at night and during days off work. No reduction of work performance.

Intermediate stage: Aching and tiredness occur early in the work shift and persist at night. It reduced capacity for repetitive work.

Late stage: Aching, fatigue, and weakness persist at rest due to the inability to sleep and to perform light duties.

Not everyone goes through these stages in the same way. In fact, it may be difficult to say exactly when one stage ends and the next begins. The first pain is a signal that the muscles and tendons should rest and recover. Otherwise, an injury can become longstanding, and sometimes, irreversible. The earlier people recognized symptoms, the quicker they should respond to them.



2.4 Identified musculoskeletal disorders, occupational risk factors and symptoms

Disorders	Occupational risk factors	Symptoms
Tendonitis/tenosynovitis	Repetitive wrist motions Repetitive shoulder motions Sustained hyper extension of arms Prolonged load on shoulders	Pain, weakness, swelling, burning sensation or dull ache over affected area
Epicondylitis (elbow tendonitis)	Repeated or forceful rotation of the forearm and bending of the wrist at the same time	Same symptoms as tendonitis
Carpal tunnel syndrome	Repetitive wrist motions	Pain, numbness, tingling, burning sensations, wasting of muscles at base of thumb, dry palm
De Quervain's disease	Repetitive hand twisting and forceful gripping	Pain at the base of thumb
Thoracic outlet syndrome	Prolonged shoulder flexion Extending arms above shoulder height Carrying loads on the shoulder	Pain, numbness, swelling of the hands
Tension neck syndrome	Prolonged restricted posture	Pain

Source: <http://www.ccohs.ca/oshanswers/diseases/rmirsi.html>

2.5 Burden of Musculoskeletal Disorders

Musculoskeletal disorders have been described as ‘the most notorious and common causes of severe long-term pain and physical disability, affecting hundreds of millions of people across the world irrespective of their occupations. In Europe, one-quarter of adults are affected by long standing musculoskeletal problems that inhibit everyday activities of man. It is at the backdrop of this that MSDs are considered to be one of the biggest health problems facing contemporary workforces (Reilly, 2001), despite decades of ergonomics intervention research (Nuemann, 2004).

Work related musculoskeletal disorders (WRMSDs) occur when there is a mismatch between the physical requirements of the job and the physical capacity of the human body. More than 100 different work-related MSDs may stem from repetitive motions that produce wear and tear on the body. Specific risk factors associated with WRMSDs include repetitive

motion, heavy lifting, forceful exertion, contact stress, vibration and awkward posture among others (Washington State Department & Industries, 2011).

WRMSDs are sometimes called ergonomics injuries and illness. Ergonomics is the study of the worker's interaction with tools, equipment, environment, jobs, tasks, work methods, work rates and other systems (Maier and Ross-Mota, 2001).

2.6 The Anatomy of the human backbone

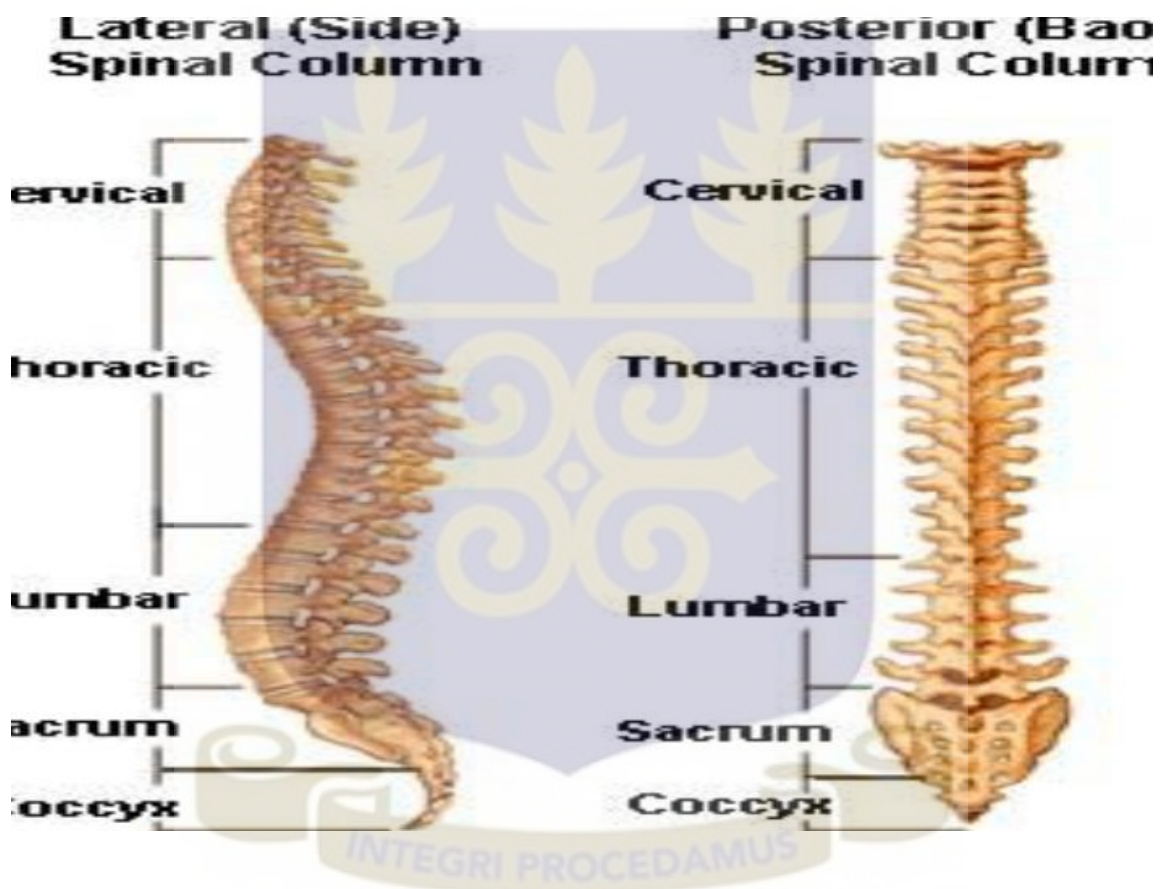


Figure 1: Anatomy of the human backbone.

The musculoskeletal system essentially consists of similar tissues in different parts of the body, which provide a panorama of diseases. The muscles are the most common site of pain. In the lower back the intervertebral discs are common problem tissues. In the neck and the upper limbs, tendon and nerve disorders are common, while in the lower limbs, osteoarthritis is the most important pathological condition.

In order to understand these bodily differences, it is necessary to comprehend basic anatomical and physiological features of the musculoskeletal system and to learn the molecular biology of various tissues, the source of nutrition and the factors affecting normal function. The biomechanical properties of various tissues are also fundamental. It is necessary to understand both the physiology of normal function of the tissues, and pathophysiology—that is, what goes wrong.

Various occupational health studies associated with the review of physiological and psychological factors are widespread such as the effects of whole-body vibration [WBV] which appears to play a significant role in the risk of herniated discs, early degeneration of the spine and lumbar associated muscles and ligaments (Gallais, 2008; Lusted, *et al.* 1996). However a recent Danish study has shown that an estimated 40% of lower back pain [LBP] diagnosis cases may be attributed to the presence of a low-variant anaerobic bacteria *Propionibacterium . Acnes* bacteria entering the vertebrae which can be treated with a course of antibiotics rather than depending solely conventional physical therapy (Perry and Lambert, 2006) (Albert, Mannichie, Sorensen *et al.*, 2010). This research challenges the general consensus that biomechanical factors are the predominant causative factor. This is contrary to the clinical position taken by the National Institute of Clinical Excellence [NICE] who prescribe to: physical activity, manual therapy, invasive procedures and surgery. Consultant Orthopaedic Surgeon Philip Sell goes further to state that back pain prevalence in the population is genetic and contests arguments of biomechanical and microbiological causes (Chen, 2013).

2.7 The Association between Musculoskeletal Disorder and Driving

In earlier studies, the prevalence of MSDs was high among bus drivers (Alperovitch *et al.*, 2010). Musculoskeletal disorders such as Low Back Pain are synonymous with work which requires prolonged sitting and awkward sitting posture such as driving. Other related MSDs

such as Upper back pain, shoulder, neck pain may also be associated with driving but are less prevalent among drivers compared to low back pain. There is a catalogue of published works that support this view which indicates a high prevalence of acute and chronic pain associated with the lower thoracic and lumbar regions of the human body. In minor cases this is usually localized to soft tissues, tendons, ligaments and bones but can also include long term conditions such as sciatica and spinal degeneration and tumours in rare occurrences (Bovenzi and Hulshof, 1999).

The occurrence of MSDs among CLDBDs can also be attributed to age and pre-existing health condition. Jaayson, 1992 suggested that injuries may sometimes lead to damage as a result of the natural aging process or as a result of pre-existing health conditions which have a bearing on the muscle or skeletal systems over the years. Most epidemiological studies support the view of the multiple causal theory model that establish the fact that MSDs and low back pain are as a result of a combination of mechanical, physiological and psychosocial factors (Bener et al., 1998; NICE, 2009).

2.8 Contribution of Low Back Pain to Musculoskeletal disorders

One of the musculoskeletal disorders is low back pain. Low back pain can generally be defined as chronic or acute pain of the lumbosacral, buttock, or upper leg region. Low back pain may manifest as sciatic pain and or lumbago. Sciatic pain refers to pain symptoms that radiate from the back region down one or both legs whereas lumbago refers to an acute episode of Low back pain. Low back pain is unequivocally one of the oldest occupational health problems in history. In 1713, Bernardino Ramazzini, the “founder” of occupational medicine, referred to “certain violent and irregular motions and unnatural postures of the body by which the internal structures are impaired. Ramazzini examined the harmful effects of unusual physical activities on the spine, such as the sciatica caused by constant turning

of the potter's wheel, lumbago from prolong sitting, and hernias among porters and bearers of heavy loads (Levy & Wegman, 2000). In most cases of low back pain, specific clinical signs are absent. Generally, low back pain impairment is regarded as a loss of ability to perform physical activities. Low back disability is defined as the limitation on a person's physical functioning of the lumbar region necessitating restricted mobility on a job (Bernard, 1997). The intermittent nature of low back pain complicates prevalence studies. Furthermore, studies of disability due to LBP are also influenced by legal and socio-economic factors. Several cross-sectional studies on LBP have been conducted in countries like the United States, Israel, The Netherlands, Belgium and some Scandinavian countries. The prevalence rates of LBP from these countries ranged from 30% to 92% (Karwowski & Marras, 1999).

Majority of these studies were conducted on the general population of many countries and not on any workers from specific occupations. Notwithstanding these, there have been few specific studies on LBP amongst truck drivers and nurses. These studies have produced varying prevalence rates from 13% to 85% (Uebel & Rae, 2009; Naude & Mudzi, 2009; Ramroop, 2006). Drivers in general comprise a large population that is exposed to many risks in their workplace. Studies have found that high-mileage drivers have been associated with high prevalence of musculoskeletal pain (Porter & Porter, 1992; Gyi & Porter, 1998; Porter & Gyi, 2002). Drivers who were exposed to whole-body vibration for extended periods of time have also been associated with LBP (Seidel & Heide, 1986; Hulshof & Van Zanten, 1997; Bovenzi & Hulshof 1999; Mansfield, 2005). Poor ergonomic design in some model of trucks has also been linked to neck and trunk pain (Massacesi, Pagnotta & Soccetti, et al., 2003). All of the above studies clearly showed that there is an association between LBP, certain risk factors and driving.

2.9 Contribution of Neck Pain to Musculoskeletal disorders

Pain in the neck is an unpleasant sensory and emotional experience in the neck region associated with actual or potential tissue damage or described in terms of such damage and it is an unspecified pain symptom (or syndrome)—not a clinical sign—that covers a variety of specific disorders, for example spinal tumours, spinal infections, and fractures (Bogduk, 2003). Specific disorders only account for approximately 10% of all cases so in most cases neck pain is non-specific (i.e. no organic or pathological cause of the symptoms can be identified) and is therefore termed a functional (somatic) symptom (Mayou & Farmer, 2002). Nonetheless, neck pain covers a range of specific pathological disorders to more somatic conditions and must therefore be seen as a heterogeneous group of pain (or perceived pain) syndrome with anatomical reference to the neck area (Viljanen et al., 2003). The second largest cause of time off work is neck pain which is second to LBP and the acute neck pain is usually the result of injury or accident, most often road vehicle accidents associated with whiplash (Ylinen et al., 2003).

Neck pain is perceived as arising in a region bounded by the superior nuchal line, laterally by the lateral margins of the neck, and anteriorly by an imaginary transverse line through the T1 spinous process (Green et al., 2008). The cervical spine (neck) is largely composed of vertebrae which begin in the upper torso and end at the base of the skull and the bony vertebrae along with the ligaments (like thick rubber bands) provide stability to the spine and the muscles allow for support and motion. The neck has a significant amount of motion and supports the weight of the head because it is less protected than the rest of the spine, the neck can be vulnerable to injury and disorders that produce pain and restrict motion (Linton et al., 2000).

Pain around the neck may originate from any of the pain sensitive structures in the neck including the vertebral bones, ligaments (anterior and posterior longitudinal ligaments) the

nerve roots, the particular facets and capsules, muscles, and dura mater. Other structures of the neck region, visceral and somatic structures are encountered (Cagnie et al., 2007). The most common causes of neck pain are soft tissue abnormalities due to injury or prolonged wear and tear and in some people, neck problems may be the source of pain in the upper back, shoulders or arms and in rare cases infection or tumours can cause neck pain (Ariens et al., 2000; Cote et al., 2008). A "rear end" automobile collision may result in hyperextension, a backward motion of the neck beyond normal limits, or hyper flexion, a forward motion of the neck beyond normal limits. Most common injuries are to the soft tissues, i.e., muscles and ligaments and severe injury with fracture or dislocation of the neck may damage the spinal cord and cause paralysis (Palmer et al., 2001). The causes of neck pain have focused on occupational risk factors either with regard to specific occupations (i.e. dentists, nurses, bus drivers, office workers, etc.) or to specific physical and psychosocial risk factors across a variety of different occupations or populations (Trinkoff et al., 2002).

2.10 Types of risk factors associated with commercial long distance bus driving

2.10.1 Physical Risk Factors and Low Back Pain

There is a body of evidence that establishes a clear association between MSDs and certain risk factors (Bovenzi and Hulshof, 1999; Tiemessen, 2008) such as whole body vibration known to play a significant role in the risk of herniated discs, early degeneration of the spine and lumbar associated muscles and ligaments. According to Chen et al (2005) and Gallais (2008), there is an increased risk of sciatica among drivers. Whiplash or neck injuries and sleeping behind the wheels results in spinal distortion resulting in an increased risk of rheumatism and osteoarthritis (Raanaas, 2008). This is consistent with a study undertaken by Johansson (2010) who found similar associations with truck drivers, the number of hours behind the wheels and presence of MSDs.

2.10.2 Individual Risk Factors and Musculoskeletal disorder- Low Back Pain

Although most epidemiological or empirical studies have concentrated on physiological factors as the main cause of MSDs (Magnusson et al, 1996), other occupational risk factors such as working hours (Sang, 2010), mileage driven (Sakakibara, 2006) have also being identified to contribute to MSDs. For LBP there appears to be a strong association with prolonged sitting posture (Sung, 2010), frequent lifts and cigarette smoking (Bonger et al, 1990; Boshuizen et al 1992; Bovenzi and Betta, 1994; Bovenzi, 1996). There is less consistent evidence relating to pulling and pushing; lack of physical fitness and psychosocial factors and individual lifestyle or behavioural factors namely age, gender and pre-existing health conditions (Jaayson, 1992; Chen, et al, 2005; Robb and Mansfield, 2007; Williams, 2011). One major challenge and constraint is that workers will often adjust their work to avoid or reduce discomfort at the onset of an acute episode of pain but this conversely places strain on other parts of the body even though most of the episodes of mechanical LBP are self-limiting. For this purpose workplace interventions are critical in the form of adjustments and/or rehabilitation even if only for temporary periods in order to manage their condition. This is a lost opportunity with CLDBDs where their only intervention is based on that of self-medication. In many cases there is a tendency of re-occurrence with an estimated 70% who have LBP going on to have three or more attacks during their lifetime (Smedley, Dick and Sadhra, 2013). In Ghana, there is no comprehensive data on how CLDBDs undergo treatment or seek medical care when they suspect the emergence of MSDs symptoms.

2.10.3 Psychosocial Risk Factors and Musculoskeletal Disorder- Low Back Pain

Psychosocial hazards range from the effects of working in isolation (Bourdorias, 2000), low support (Kompier and Di Martino, 1995; Raanaas and Anderson, 2008), low job satisfaction, working in unsociable hours (Hamelin, 2000; Apostolopoulos et al, 2012),

night work (Ulh and Marqueze, 2012) through to threats from physical assault and mental overload (Bourdorias, 2000; Chen, 2005; Makishita and Matsunaga, 2008). In a study conducted by Marras (2008), it was reported that psychosocial hazards were responsible for 28%-84% of risk of MSDs (particularly arms and upper body) and 14% -63% of risk to lower back respectively. Psychosocial factors associated with MSDs- low back or neck pain among CLDBDs included extended uninterrupted driving periods, frequency of job problems, high psychosocial demands, high job dissatisfaction, and low supervisory support. An analysis of specific job problems is provided which may be useful in setting priorities for research and intervention efforts in this high risk occupation.



CHAPTER THREE

METHODOLOGY

3.1 Study design

The study design used was a cross-sectional one. This study design was used to gather information about the sample on their beliefs, opinions and attitudes about the study for analysis.

3.2 Study Area

The Greater Accra Region is the capital of Ghana and is the region where the three arms of government, namely the seat of government and its various ministries, the parliament house and the Supreme Court where the judiciary is situated. The political administration of the Greater Accra Region is through the local government system. Each District, Municipal or Metropolitan Area is administered by a Chief Executive Officer, representing the central government but deriving authority from an Assembly headed by a presiding member elected from among the members.

Accra Metropolitan Area (AMA) covers a land area of 173 km² with a population of 4,010,054 representing 16.3% of the national population. The Greater Accra is a major centre for manufacturing, marketing, finance, insurance, transportation and tourism. It has about 350 major industrial establishments, the Central Bank, nine (9) Commercial Banks (with 81 Branches), four (4) Development Banks (with 19 Branches), four (4) Merchant Banks (with 7 Branches), three (3) Discount Houses, one (1) Home Finance Mortgage Bank, Building Societies, a Stock exchange, two hundred and eighteen (218) Foreign Exchange Bureaux, nine (9) Finance Houses, nine (9) Insurance Companies, twelve (12) Insurance Brokerage Firms, two (2) Savings and Loans Companies and a host of Real Estate

Developers. The road network in the Metropolis is about 1118 km made up of 918 km paved and 200 km of unpaved roads.

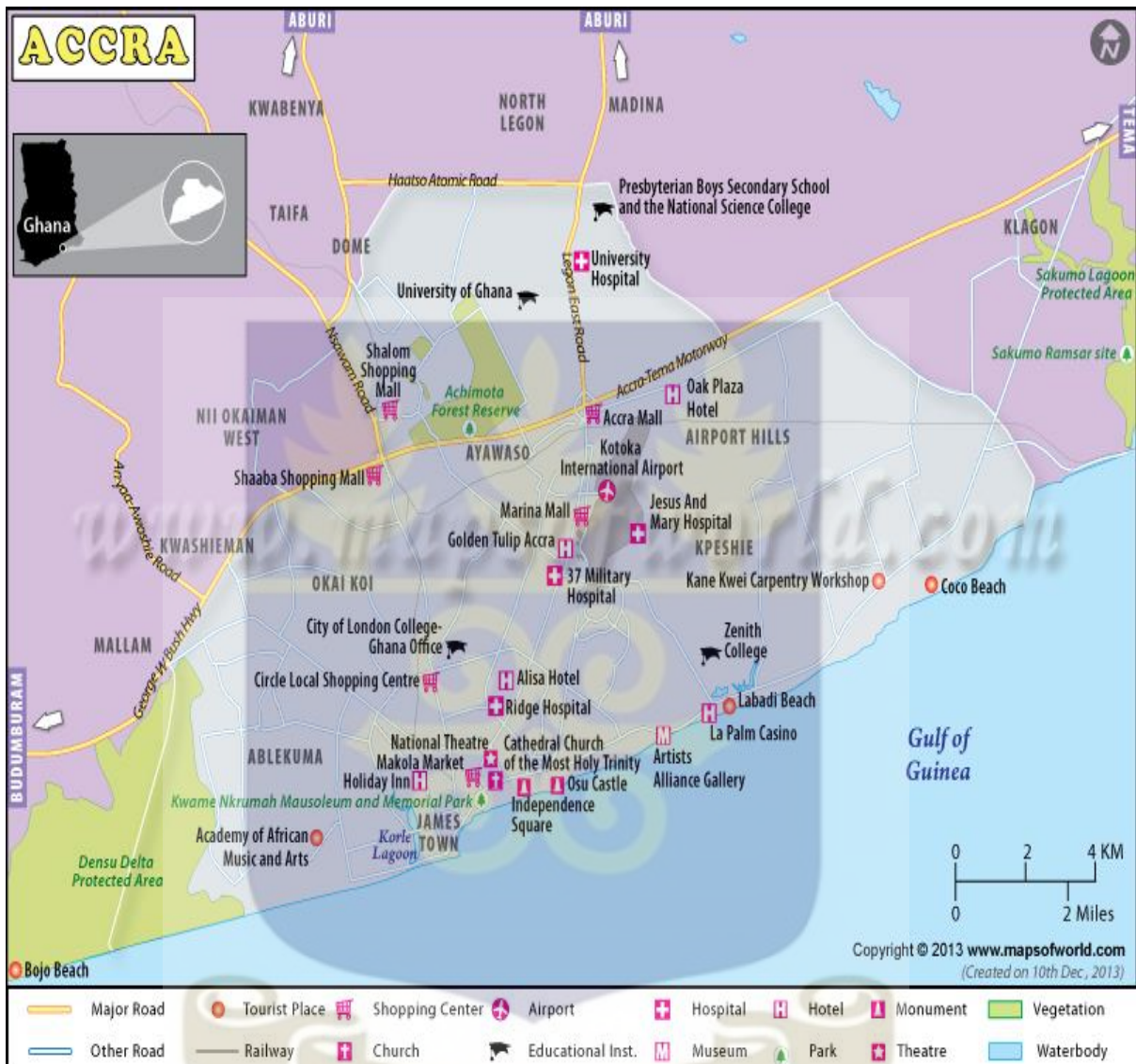


Figure 2: Map of study area - Accra

Source: Google maps, 2015

3.3 Variables

3.3.1 Dependent variables

The dependent variable is the occurrence of MSDs symptoms such as neck, shoulder, lower back, upper back, wrist/hand, ankle / feet, hips/thigh etc.

3.3.2 Independent variables

The independent variables are the risk factors that cause MSDs. These factors comprise of physical (sitting with back rounded or shoulder slumped forward, holding the neck in forward posture for a long time, prolonged sitting, bending, awkward postures, lifting and load handling), Individual or lifestyle factors (age, sex, distance covered, smoking status, educational level, years of driving) and psychosocial (driving fatigue / stress, mental vitality, driving hours).

3.4 Study population

Geographically, the study population for this study comprised of (CLDBDs at the VIP bus terminal located at the Kwame Nkrumah Circle a suburb of the Accra Metropolitan Area. Commercial long distance bus drivers usually move passengers/ the travelling public from Accra to other parts of the country and back and are susceptible to MSDs in some parts of their body. A total study population of two hundred (200) constituting drivers and Co-drivers were used.

3.5 Sampling

3.5.1 Sample size calculation

The proportion of CLDBDs who are susceptible to musculoskeletal disorders and this was estimated using the formula developed by Yamane (1973) to yield a representative and feasible sample for proportions.

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

Where n = desired sample size,

N = the study population

$e =$ desired level of precision set at 5%

Therefore, substituting the values of $N = 200$, $e = 5\% = 0.05$

$$n = 200 / [1 + 200 (0.05)^2]$$

$n = 133$ (Rounded)

From this calculation, a total sample size of 133 CLDBDs and spare drivers were recruited for the study.

3.5.2 Sampling method

A convenience sampling method was used to sample participants for the study. In this regard, the VIP bus station at Accra was visited daily for a week until a convenient sample of one hundred and thirty-three (133) participants was obtained.

3.6 Data collection techniques

A semi-structured questionnaire was used in collecting data from the VIP Bus Terminal. For the targeted participants or respondents who are not eligible to read, the questionnaire was explained to them in the form of interviews and their responses recorded. The questionnaires gathered information on socio-demographic characteristics of the respondents as well as their working conditions, risk factors, and exposure characteristics, prevalence and severity of associated chronic pain on the part of the body that could be attributed to MSDs.

3.7 Quality control

The completed questionnaires were critically reviewed at the end of each day and any incompletely filled questionnaires were returned for completion before acceptance.

3.8 Data processing and analysis

The completed questionnaires were coded into SPSS version 16.0 and analysed by using descriptive statistics such as frequencies, percentages, tables and charts were generated to present the output of the main results. Further statistical analysis such as chi-square test of independence and fitting of a multinomial logistic regression model and analysis of variance (ANOVA) was conducted to explore the association between the risk factors and MSDs.

3.9 Ethical Consideration/Issues

Before conducting the study, an ethical clearance letter from the Ghana Health Service Ethical Review committee was sought before commencement of the study. Also permission letter from the VIP Bus Services was obtained prior to the study. Informed consent process: Prior to data collection eligible participants were informed clearly on the aim of the study both orally and written consent forms. Furthermore, participants were given the opportunity to read the consent forms, ask questions where appropriate for clarity and were made to sign if agreed to participate.

3.10 Pre-test /Pilot study

To ensure data quality, the questionnaire were pre-tested at Chisco Transport Services who operates long distance commercial bus services similar to VIP bus services. All anomalies and gaps in the questionnaire were corrected before the actual study.

3.11 Limitation of the study

1. The data used for the analysis was subjective as there is the tendency for recall biases due to participants having to recall episodes of pain or discomfort on their body parts.

2. There was the difficulty in making a generalization of prevalence of MSDs among CLDBS since this study was restricted to only VIP bus drivers but not others who render the same services because of the unorganized nature of the operations.



CHAPTER FOUR

RESULTS

4.1 Demographic characteristics of study population

Table 1: Distribution of drivers by the various demographic factors

Characteristics of Study Population	Number(n)	Percent(%)
Age		
< 40	42	31.6
40-49	75	56.4
50+	16	12.0
Marital status		
Single	32	24.1
Married	101	75.9
Formal education		
Basic	71	53.4
Secondary	61	45.9
None	1	0.8
Years of driving		
<6years	93	69.9
6+ years	40	30.1
Distance covered		
<500km	25	18.8
500+km	108	81.2
Smoking Status		
Yes	49	36.8
No	84	63.2
Alcohol use		
Yes	87	65.4
No	46	34.6
Physical exercise		
Yes	18	13.5
No	120	86.5

Table 1 shows the summary characteristics of CLDBDs studied in Greater Accra. 42(31.6%) of the respondents were less than 40 years, 75(56.1%) were aged 40-49 years. 16(12%) were aged 50 years or more. 101(75.9%) were married with 32(24.1%) being single. A total of 71(53.4%) had basic education, 61(45.9%) had secondary education and only 1(0.8%) had no form of formal education. Of those sampled, 93(69.9%) have been driving commercial buson long route for less than 6 years whereas, 40(30.1%) of these numbers had been driving for 6 years and more. Moreover, 108(81.2%) covers over 500km an average per journey while the remaining 25(18.8%) covers below 500km per journey. Approximately 49(37%) of the drivers studied said they smoke while 87(65.4%) drink some alcohol. Also, only 18(13.5%) of the respondents were found to engage in some form of physical exercise regularly.

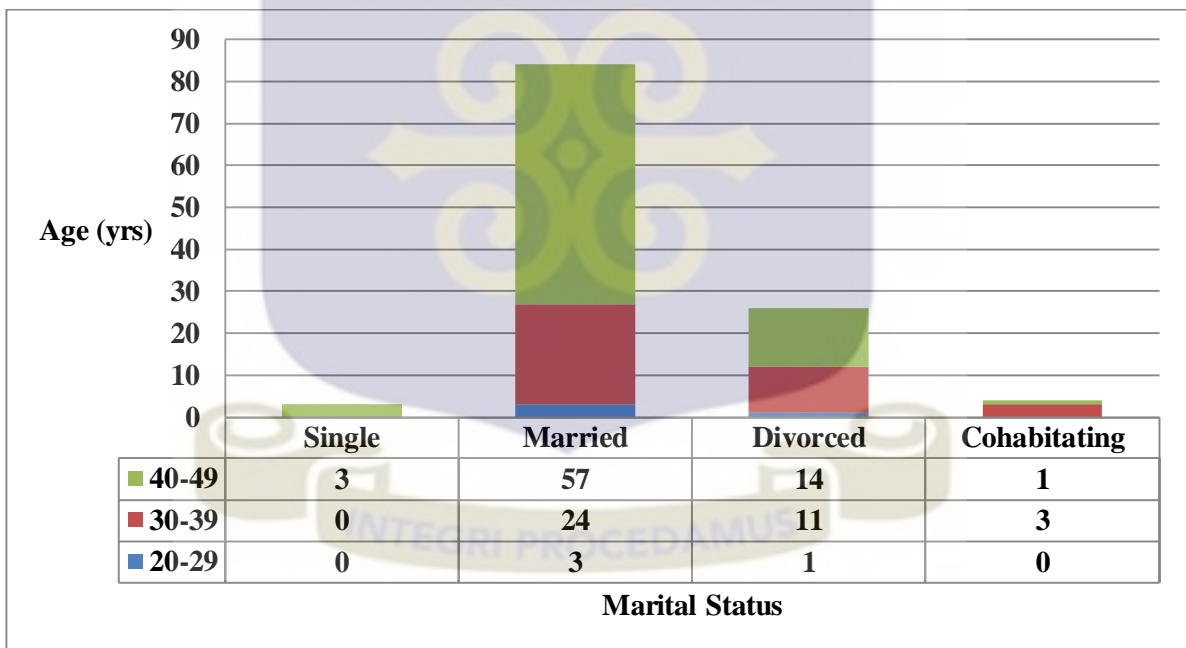


Figure 3: Age distribution of CLDBDs with respect to marital status.

Figure 3 reveals the age distribution of CLDBDs with respect to marital status. Majority, 84(56.2%) of the CLDBDs were married, divorced; 26 (34.58%), cohabitating; 4(5.32%); with a smaller number of drivers unmarried being 3(3.99%) respectively.

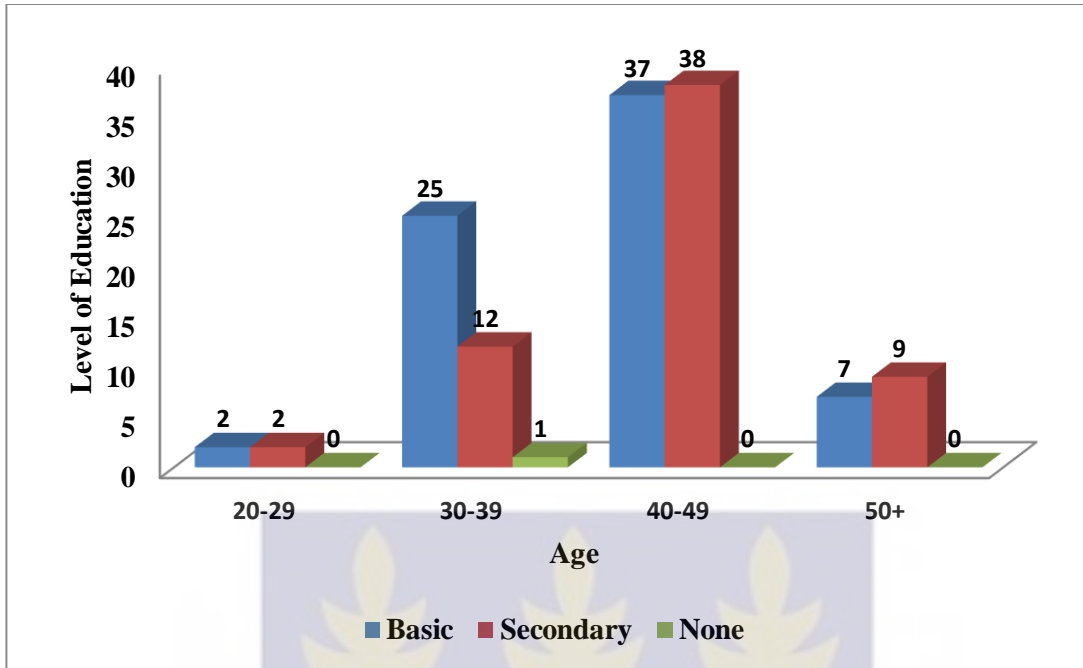


Figure 4: Age distribution of drivers with respect to their level of education.

The figure 4 above shows that most of the CLDBDs aged 40-49 years were more educated than those aged 30-39 years. Also, CLDBDs between the ages of 20 and 29 years were less educated than those 50 years and above.

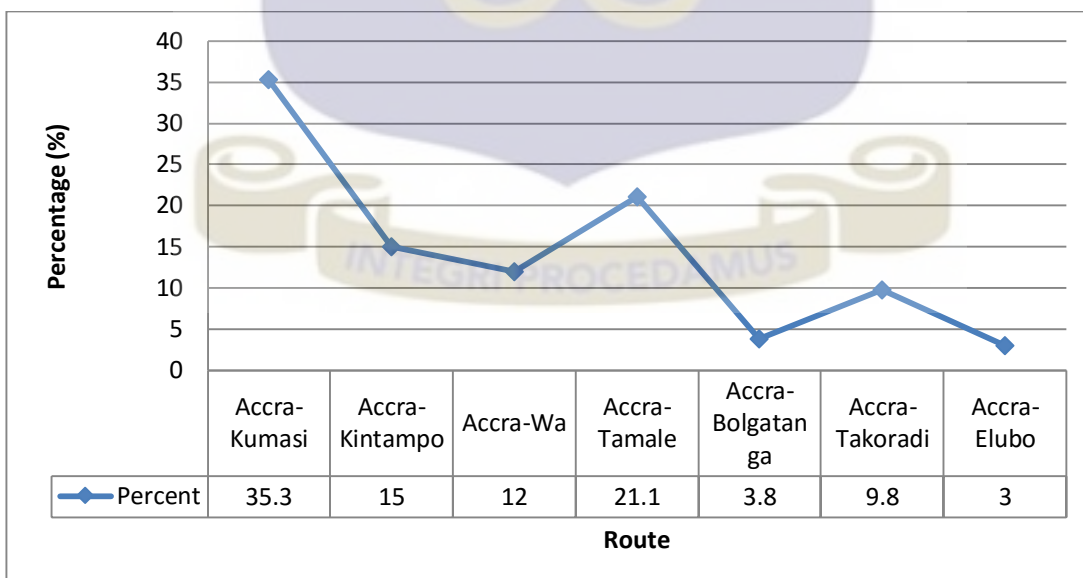


Figure 5: Distribution of respondents with respect to routes plied.

Figure 5 reveals that a greater number of the CLDBDs under consideration usually travel along the Accra-Kumasi road, followed by Accra- Tamale road with Accra-Elubo being the least travelled.

Table 2: Distribution of drivers with respect to the length of time in driving commercial vehicles.

	Age	Frequency (f)	Percent (%)	Cumulative Percent (%)
Valid	< 2 years	20	15.0	15.0
	2-5 years	73	54.9	69.9
	6-10 years	33	24.8	94.7
	> 10 years	7	5.3	100.0

From table 2.0, the length of time respondents have been driving commercial buses were as follows; less than 2 years (15%), 2-5 years (54.9%), 6-10 years (24.8%) and greater than 10 years (5.3%).

4.2 Prevalence of musculoskeletal symptoms/pain amongst CLDBDs

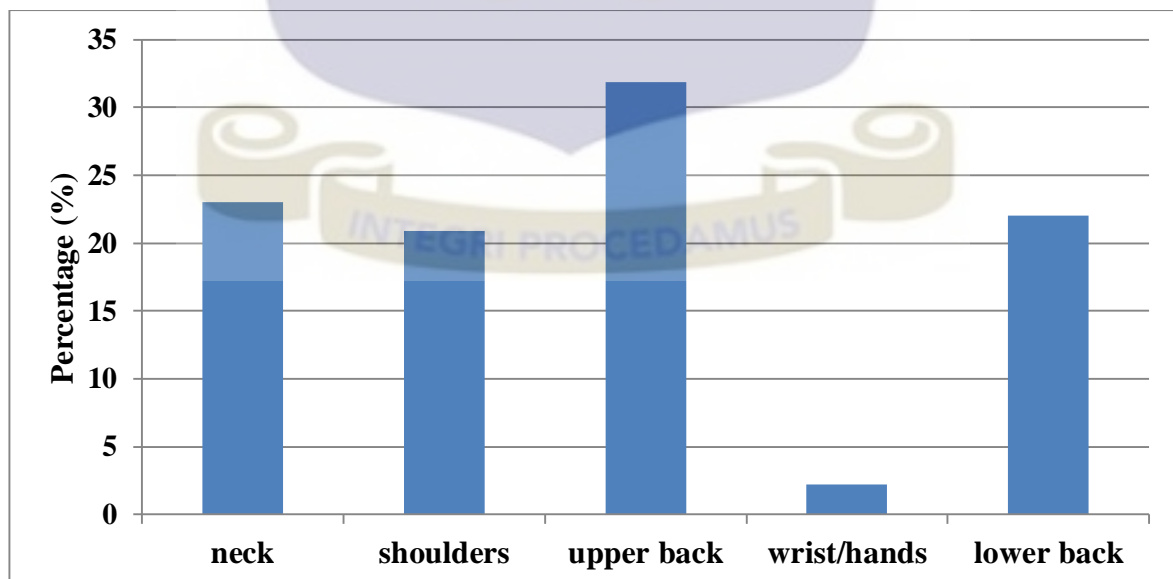


Figure 6: Prevalence of MSDs in study population.

Figure 6 above shows the prevalence of MSD among the study population. Approximately, 32% of the respondents experienced upper back pain; neck pain (23%); lower back (22%) and approximately 21% reported of pains in the shoulders. The least reported disorder was found to be pains in wrist/hand (2.2%) and none of the respondents complained of symptoms, pain or discomfort in the elbows, hips/thighs, knees and ankles/feet.

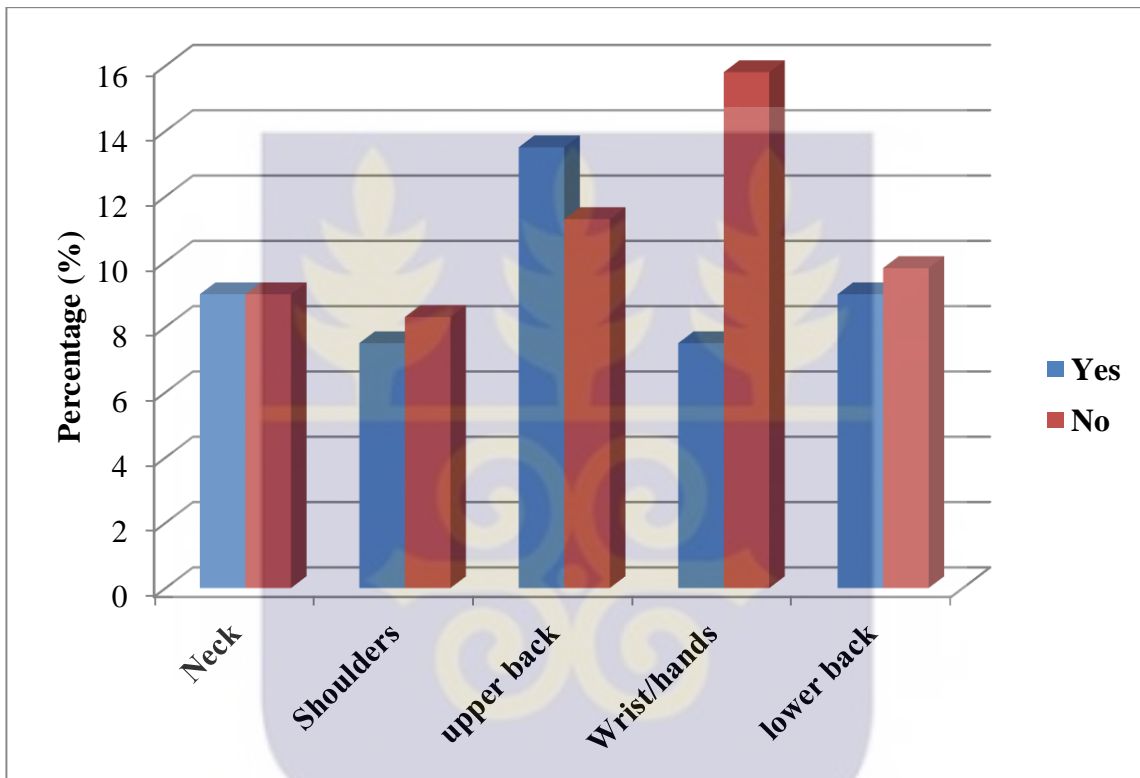


Figure 7: Distribution of drivers unable to perform normal activities due to symptoms of MSDs in the last 12 months.

4.3 Treatment methods sought by respondents upon experiencing symptoms of MSDs.

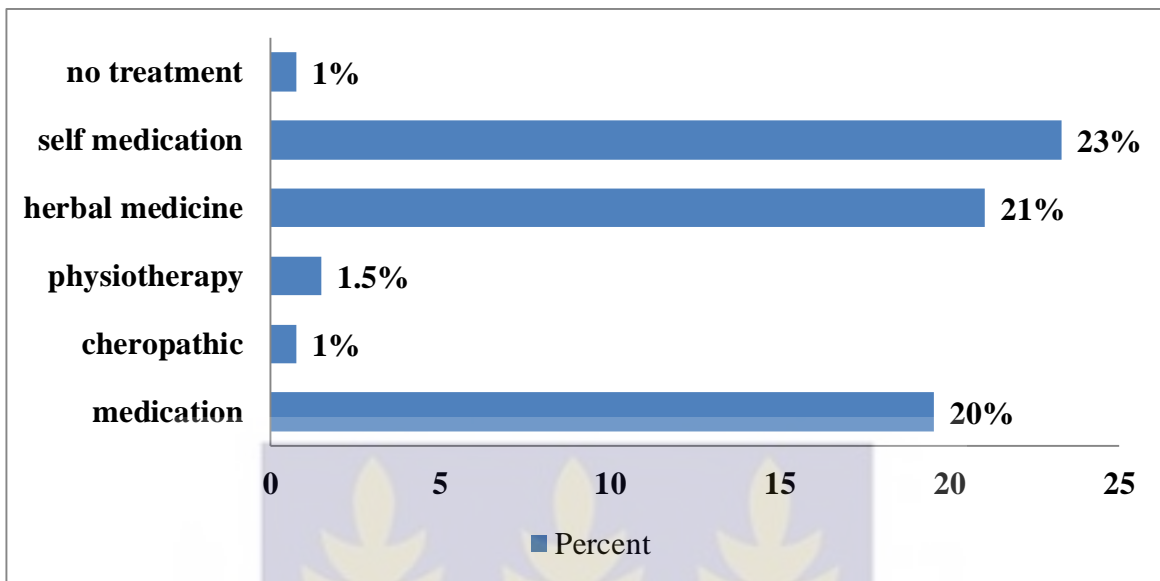


Figure 8: Forms of treatment sought upon experiencing symptoms of MSDs.

Most of the CLDBDs self-medicate upon experiencing pains, followed by applying herbal medicine and prescribed medications; with a few engaging in physiotherapy, chiropractic and no treatments.

4.4 Test for normality of the dataset on MSDs.

The Shapiro Wilk's test was used to test for normality of the data.

Hypothesis

Null hypothesis: The observed distribution of the MSDs data fits the normal distribution.

Alternative hypothesis: The observed distribution of the MSDs data does not fit the normal distribution.

Table 3: Test of Normality $\alpha = 0.05$

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Musculoskeletal disorder	0.163	89	0.000	0.936	89	0.000

^a Lilliefors Significance Correction

The p-value < 0.001 implies the null hypothesis is rejected and can conclude at 5% level of significance that the data set on MSDs is normally distributed. This further suggests that parametric methods or analysis can be used in comparing MSDs among two or more groups.

4.5 Association of MSDs with demographic factors such as marital status, age and length of time in driving.

4.5.1 Hypothesis

Null hypothesis: The average impact of MSDs is the same among different demographic factors.

Alternative hypothesis: The average impact of MSDs is not the same among different demographic factors.

Table 4: ANOVA $\alpha = 0.05$

Statistic		Sum of Squares	Df	Mean Square	F	Sig.
Marital Status	Between Groups	7.610	16	0.476	2.322	0.008
	Within Groups	14.750	72	0.205		
	Total	22.360	88			
For how long have you being driving Commercial vehicle?	Between Groups	22.889	16	1.431	3.067	0.001
	Within Groups	33.583	72	0.466		
	Total	56.472	88			
Participants age	Between Groups	13.051	16	0.816	2.004	0.024
	Within Groups	29.308	72	0.407		
	Total	42.360	88			

Table 4: Association of MSDs with demographic factors such as marital status, age and length of time in driving

From the Analysis of Variance (ANOVA) table, the p-values for marital status, length of time in diving and age were 0.008, 0.001, and 0.024 respectively; which are all less than the level of significance of 0.05. Thus, the impact of the various forms of MSDs is the same for each level or group considered respectively for each demographic factor (marital status, participant's age and length of time in driving).

4.6 To determine whether MSDs are influenced by the various forms of risk (physical and psychosocial) factors.

4.6.1 Influence of physical risk factors on MSDs

Hypothesis

Null hypothesis: There is no association of risk (physical) factors on MSDs among CLDBDs.

Alternative hypothesis: There is association of risk (physical) factors on MSDs among CLDBDs.

Table 5: Chi-Square Tests

Statistic	Value	df	AsympSig. (2-sided)
Pearson Chi-Square	185.126	128	0.001
Likelihood Ratio	130.835	128	0.414
Linear-by-Linear Association	2.568	1	0.109

The p-value of the Chi-square test statistics is 0.001 (less than $\alpha = 0.05$) which implies that, the null hypothesis is rejected and can conclude at 5% level of significance physical risk factors such as prolong sitting and stretch of arms, sitting with back slumped, stretching of

foot on brake and holding neck forward could cause MSDs in CLDBDs. Hence, certain measures must be put in place so as to reduce the impact of these physical risk factors on CLDBDs.

4.6.2 Influence of psychosocial risk factors on MSDs

Hypothesis

Null hypothesis: There is no association of risk (psychosocial) factors on MSDs among CLDBDs.

Alternative hypothesis: There is association of risk (psychosocial) factors on CLDBDs.

Decision rule

Reject the null hypothesis if p-value is less than significance level of $\alpha = 0.05$.

Table 6: Chi-Square Tests

Statistic	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	88.320	64	0.024
Likelihood Ratio	80.269	64	0.082
Linear-by-Linear Association	1.683	1	0.195

The p-value of the Chi-square test statistics is 0.024 (less than $\alpha = 0.05$) which implies that, the null hypothesis is rejected and can conclude at 5% level of significance psychosocial risk factors such as duration of driving, driving fatigue or stress, social support and mental conditions could cause MSDs among CLDBDs. In view of this, certain remedies must be established so as to eradicate the prevalence of MSDs in drivers.

4.7 Multinomial Logistic Regression Model

4.7.1 Assessment of impact of factors age, average distance covered and nature of fitness exercise on MSDs.

Model development:

The dependent variable of the logistic regression model is the various forms of MSDs with levels;

- No pain
- Neck pain
- Shoulder pain
- Upper back pain
- Wrist/ hands pain
- Lower back pain (Reference point).

Whereas the independent variables considered under this model are; the driver's age, average distance covered per journey and nature of physical activities. These independent variables were all non-metric or nominal (categorical) and thus; considered as the "factor" of the multinomial regression model.

Reasons for our choice of variables:

The logistic regression seeks to determine whether the type of MSDs associated with CLDBDs could be influenced by certain factors such as ones' age, average distance covered per journey and whether they involve themselves in vigorous sporting, fitness or recreational activities. This is because these factors from previous literatures were found to influence the rate of MSDs in people.

4.7.2 Assumptions of the model

- The independent variables may either be numerical or categorical.
- The dependent variable has to be categorical. That is, it must be possible to divide the responses into different categories.
- The data do not need to have a normal distribution, no linear relationship and no equality of variance.

4.7.3 The relationship between dependent and independent variables by significance test of the model log likelihood (Assessing overall model fit)

Hypothesis

Null hypothesis: There is no association between the dependent variable (types of MSDs) and the independent variables (driver's age, average distance covered per journey and nature of fitness/ sporting exercise or activities)

Alternative hypothesis: There is association between the dependent variable (types of MSDs) and the independent variables (driver's age, average distance covered per journey and nature of fitness/ sporting exercise or activities).

Table 7: Model Fitting Information

Model	Model criteria -2 log likelihood	fitting Chi-square	Likelihood ratio tests Df	Sig
Intercept only	188.178			
Final	135.827	52.351	35	0.030

From table 7, the initial log likelihood value (188.178) is the measure of the model with no independent variable; whereas the final log likelihood value (135.827) is the measure of the model computed after all the independent variables; driver's age, average distance covered per journey and nature of fitness/ sporting exercise or activities were entered into the logistic

regression model. The difference between these two log likelihood values (188.178-135.827) measures the model Chi-Square value, 52.351 and its corresponding p-value is 0.030.

Decision rule:

Reject the null hypothesis if $p\text{-value} = 0.030$ is less than $\alpha = 0.05$.

Decision

Reject the null hypothesis since $p\text{-value} = 0.030$ is less than $\alpha = 0.05$ and can conclude at 5% level of significance that there is association between the dependent variable (types of MSDs) and the independent variables (driver's age, average distance covered per journey and nature of fitness exercise or activities).

4.7.4 Assessing the strength of the relationship between the dependent variable and the independent variables.

Table 8: Pseudo-R Square

Cox and Snell	0.325
Nagelkerke	0.339
McFadden	0.122

The value of Nagelkerke R^2 is 0.339 which implies that, approximately 34% of the variability in the dependent variable is accounted for or explained by the multinomial logistic regression model. Hence, there is a less strong relationship between the dependent variable and the independent variables.

4.7.5 Identifying the statistically significant independent or predictor variables (Part A)**Table 9: Likelihood Ratio Tests**

Effect	Model Fitting Criteria -2 Log Likelihood of Reduced Model	Likelihood Ratio Tests		
		Chi-Square	df	Sig.
Intercept	1.358E2 ^a	0.000	0	-
Average distance	166.155	30.328	15	0.011
Age	149.559	13.732	15	0.546
Physical activity	145.891	10.064	5	0.073

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are zero (0).

This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

From the table, the log likelihood value of the variable “Average distance” is 166.155 with a p-value of 0.011; whereas the log likelihood value for the variables “age” and physical activity were 149.559 and 145.891 with their corresponding p-values of 0.546 and 0.073 respectively. From these statistical values, it can be concluded that the average distance covered by CLDBDs per journey has a significant effect on predicting the type of MSDs; whereas age and physical activities were insignificant.

4.7.6 Identifying the statistically significant levels of the independent variables (PartB)

Table 10: Parameter estimates of the logistic regression model.

Parameter Estimates									
During the last 12 months have you had trouble (aches, pains, discomfort, and numbness) in any of the ff. body parts?		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
No pain	Intercept	0.104	1.465	0.005	1	0.943			
	[distance=2]	16.064	1802.48	0.000	1	0.993	9.473E6	0.000	
	[distance=3]	1.221	1.030	1.407	1	0.235	3.392	0.451	25.517
	[distance=4]	1.163	1.018	1.305	1	0.253	3.199	0.435	23.528
	[distance=5]	0			0				
	[Age=1.00]	15.473	4255.64	0.000	1	0.997	5.246E6	0.000	
	[Age=2.00]	-0.033	1.313	0.001	1	0.980	0.967	0.074	12.684
	[Age=3.00]	-0.890	1.186	0.563	1	0.453	0.411	0.040	4.196
	[Age=4.00]	0			0				
	[*ph1=1]	1.093	1.167	0.877	1	0.349	2.983	0.303	29.354
[**ph1=2]	0			0					
Neck pain	Intercept	0.761	1.506	0.255	1	0.613			
	[distance=2]	17.217	1802.48	0.000	1	0.992	2.999E7	0.000	
	[distance=3]	0.024	1.078	0.000	1	0.982	1.024	0.124	8.474
	[distance=4]	-0.226	1.077	0.044	1	0.834	0.798	0.097	6.588
	[distance=5]	0			0				
	[Age=1.00]	16.548	4255.64	0.000	1	0.997	1.538E7	0.000	
	[Age=2.00]	-0.726	1.423	0.260	1	0.610	0.484	0.030	7.870
	[Age=3.00]	-1.261	1.270	0.986	1	0.321	0.283	0.024	3.416
	[Age=4.00]	0			0				
	[*ph1=1]	-17.026	2187.22	0.000	1	0.994	4.032E-8	0.000	
[**ph1=2]	0			0					
Shoulders Pain	Intercept	1.848	1.420	1.694	1	0.193			
	[distance=2]	15.652	1802.48	0.000	1	0.993	6.276E6	0.000	
	[distance=3]	0.051	1.001	0.003	1	0.960	1.052	0.148	7.484
	[distance=4]	-1.101	1.075	1.048	1	0.306	0.333	0.040	2.736
	[distance=5]	0			0				

	[Age=1.00]	14.757	4255.64	0.000	1	0.997	2.565E 6	0.000	
	[Age=2.00]	-1.112	1.351	0.677	1	0.411	0.329	0.023	4.649
	[Age=3.00]	-2.485	1.240	4.016	1	0.045*	0.083	0.007	0.947
	[Age=4.00]	0			0				
	[*ph1=1]	0.515	1.348	0.146	1	0.702	1.674	0.119	23.502
	**ph1=2]	0			0				
Upper back Pain	Intercept	-0.536	1.683	0.102	1	0.750			
	[distance=2]	18.289	1802.48	0.000	1	0.992	8.769E 7	0.000	
	[distance=3]	1.370	1.261	1.180	1	0.277	3.935	0.332	46.614
	[distance=4]	0.815	1.274	0.410	1	0.522	2.260	0.186	27.461
	[distance=5]	0			0				
	[Age=1.00]	-1.115	5702.57	0.000	1	1.000	0.328	0.000	
	[Age=2.00]	0.202	1.392	0.021	1	0.884	1.224	0.080	18.738
	[Age=3.00]	-0.864	1.280	0.455	1	0.500	0.422	0.034	5.181
	[Age=4.00]	0			0				
	[*ph1=1]	-0.127	1.409	0.008	1	0.928	0.881	0.056	13.955
	**ph1=2]	0			0				
	Wrist/Hands Pain	Intercept	-33.934	8850.99	0.000	1	0.997		
[distance=2]		16.617	8953.53	0.000	1	0.999	1.648E 7	0.000	
[distance=3]		16.914	7203.89	0.000	1	0.998	2.217E 7	0.000	
[distance=4]		16.718	7203.89	0.000	1	0.99	1.823E 7	0.000	
[distance=5]		0			0				
[Age=1.00]		15.539	0.000		1		5.606E 6	5606457.1 08	5606457. 108
[Age=2.00]		16.315	5142.39	0.000	1	0.997	1.217E 7	0.000	
[Age=3.00]		14.538	5142.39	0.000	1	0.998	2.060E 6	0.000	
[Age=4.00]		0			0				
[*ph1=1]		-15.490	6105.22	0.000	1	0.998	1.873E -7	0.000	
**ph1=2]		0			0				
a. The reference category is: lower back.									
b. Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing.									
c. This parameter is set to zero because it is redundant.									

[Distance=1] reference point distance < 200km. *ph1=1 - “YES” response for physical activity.

[Distance =2]distance between 200 and 500km. **ph1=2- “NO” response for physical activity.

[Distance=3] distance between 500 and 800km. [Age=1.00] ages between 20 and 29 years.
[Distance=4] distance between 800 and 1000km [Age=2.00] ages between 30 and 39 years.
[Distance=5] distance > 1000km. [Age=3.00] ages between 40 and 49 years.
[Age=4.00] ages 50+ years Exp (B) = odds ratio corresponding to each independent variable.

Interpretations and conclusions from the output of the parameter estimates of the multinomial logistic regression model.

Interpretation for No pain:

From the table 10, it was found out that a driver who covers a distance of 500 to 800km per journey is approximately 3.4 times likely to experience any form of pain or discomfort as compared to those who travel short distances less than 200km per journey. Moreover, the odds of a driver travelling at an average distance of 800 to 1000km per journey and experiences no MSDs was 3.2 times greater than that of the odds of drivers travelling at an average distance less than 200km. This further implies that, drivers who normally travel at an average distance greater than 200km per journey are less susceptible to MSDs which is possible because long distance drivers usually make a stop and rest but short distance drivers do not. Also, long distance roads are smooth with minimal pot-holes, with buses in good condition and not experiencing heavy traffic which does not make the journey tiresome but short distance drivers do not make a stop, and roads are usually rough and also sometimes may encounter heavy traffic which can make travelling time longer. Lastly, the age category who operate CLDBDs over 800 to 1000km constitutes those within the healthy age group which is dominated by the young men and tend to have time to engage in physical activities whereas those who plied CLDBDs and less than or equal to 200km are more elderly and hardly engaged in physical exercise hence their susceptibility to MSDs is high.

Interpretation for Neck pain

Results from **Table 10.0** revealed that drivers who travelled an average distance of 500 to 800km are 2.4% more likely to experience neck pain as compared to those who travels at a distance below 200km per journey. In addition, CLDBDs who travel at a distance of 800 to 1000km per journey were found to be 79.8% less likely to experience neck pain relative to those who travel at a distance less than 200km per journey. It can further be inferred that, CLDBDs travelling at average distance of 500 to 800km are more susceptible to neck pain, followed by those who travels at a distance less than 200km and then 800 to 1000km per journey. This again supports the likelihood that CLDBDs make a stop and rest but short distance drivers do not. Again, duration spent by short distance drivers due to heavy traffic and poor road network may have accounted for the neck pain they experienced.

Interpretation for Shoulder pain

The outcome of the various parameter estimates shows that the odds for drivers who travel at distances of 200 to 500km, 500 to 800km and 800 to 1000km per journey, are approximately 99.3%, 96% and 30.6% respectively are less likely to experience shoulder pains in relation to those who cover distance less than 200km per journey. This implies that driver travelling at distance less than 200km per journey were found to be susceptible to shoulder pains as compared to other distance covered. Also an association existed between drivers aged 40 to 49 years and shoulder pain $p < 0.05$; CI [(0.007, 0.947)].

Interpretation for Upper back pain

The results show that the risk of experiencing upper back pains is approximately 4times and 2times greater for drivers who travel at an average distance of 500 to 800km and 800 to 1000km respectively than those who travel at distance less than 200km. In view of this, it

can be concluded that drivers who normally travel at a distance of 500 to 800km per journey are more exposed to experiencing upper back pains relative to those of other distances.



CHAPTER FIVE

DISCUSSION

5.0 Introduction

The study investigated MSDs amongst CLDBDs in the Greater Accra Region of Ghana.

5.1 Prevalence and sequence of musculoskeletal disorders among commercial long distance bus drivers

Overall, MSDs was prevalent in CLDBDs. Majority, 108(81.2%) of the CLDBDs who cover distances over 500km and above indeed had experienced one form of MSDs or the other with the most affected body parts being upper back, neck, lower back and shoulder respectively with the wrist/hand being the least affected. These MSDs discomfort/ pain can be attributed to different postures these drivers assume during their usual driving operations (Waters et al., 2011). These postures as identified by this study are prolong sitting, sitting with back rounded or shoulder slumped forward while driving and also holding the neck in a forward bent posture for a prolong time while driving. The symptoms of MSDs were reported by almost all ages of the study population. Minority, 18(13.5%) of respondents were found to engage in some form of physical exercise regularly.

Commercial long distance bus drivers for the most part of their journey remain physically inactive since their work is more sedentary, confined to restricted workstation, and most of them do not make any effort to exercise when not working (Abban, 2013; Kurosaka et al., 2000; Kompier, 1996).

5.2 Socio-demographic factors which predispose CLDBDs to MSDs

The ages mostly affected were those from 50 years and above and those who have been involved in commercial long distance driving for 6 years and above. The symptom of MSDs was more prevalent in those CLDBDs who said engaged in driving for long hours. The

findings imply that engaging in long distance driving predisposes the individual to MSDs especially as one advanced in age and also sits behind the steering wheel for long. The effects may be cumulative, and in time degenerates into MSDs. One measure which could help alleviate the suffering of these drivers is to have co-drivers or spare drivers but findings from the study showed that most of the drivers at the VIP bus terminal at Kwame Nkrumah circle do not have spare drivers. They therefore travel the long distances for several hours in many cases assuming uncompromising postures. The end result is MSD symptoms were found to be prevalent among the long distance drivers. Empirical studies have found in support of the above findings that the occurrence of MSDs among CLDBDs can also be attributed to age and pre-existing health condition (Abledu et al., 2014; Abban, 2013; Jaayson, 1992).

5.3 Association between risk factors and MSDs among CLDBDs

The study revealed that CLDBDs reported symptoms of MSDs more often. Drivers were also more often exposed to psychosocial factors and unhealthy lifestyle factors. Exposure to prolonged sitting was common and correlated positively with physical risk factors associated with MSDs. Awkward working postures were also common. The exposure to so many risk factors emphasizes the importance to adopting a holistic approach in intervention studies. High prevalence of MSDs among bus drivers has been reported (Alperovitch et al., 2010). In this study the most commonly reported pain areas were the wrist, upper back, lower back, neck, and shoulders. In the present study, statistically significant associations were found between age of drivers and MSDs; driving a distance between 200km to 500km also had association with MSDs reported (**Table 10.0**). These were found to be risk factors for neck and shoulder disorders (Ariens et al., 2000; Cote et al., 2008). A larger proportion of drivers who covered shorter distances reported MSDs symptoms more than those who covered long distances. A good question is whether some bus drivers start their working

career driving long distance buses and change to driving city buses when health problems emerge.

An association between different postures; prolonged sitting, sitting with back rounded or shoulder slumped forward while driving and also holding the neck in a forward bent posture for a prolonged time while driving and MSDs were found. The practices put the driver under intense stress and fatigue as they assume these postures for long hours covering several kilometers. In support of the above findings, epidemiological studies have identified that a combination of mechanical, physiological and psychosocial factors are the cause for lower back pain symptom in MSDs (Bener et al., 2013; NICE, 2009).

There is a body of evidence that establishes a clear association between MSDs and certain risk factors (Bovenzi and Hulshof, 1999; Tiemessen et al., 2008). Whole body vibration is known to play a significant role in the risk of herniated discs, early degeneration of the spine and lumbar associated muscles and ligaments. According to Chen et al (2005); Gallais (2008), there is an increased risk of sciatica amongst CLDBDs. Similarly, whiplash neck injuries and sleeping behind the wheels results in spinal distortion resulting in an increased risk of rheumatism and osteoarthritis (Raanaas, 2008). Johansson (2010) also found similar associations with truck drivers, the number of hours behind the wheels and presence of MSDs. Several studies have lend credence to the findings in the present study and reveals that the operational practices of long distance drivers which predisposes them to MSDs is happens.

Psychosocial factors such as stress, smoking, and alcoholism may be associated with physical health. Psychosocial factors are an important cause of health inequalities (Marmot, 1998). Such factors include aspects of the social environment with a negative connotation.

This study has shown clearly that stress, smoking and alcoholism may be risk factors for the development of MSDs.



CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This chapter entails the conclusions and recommendations

6.1 Conclusion

Overall, symptoms of MSDs were prevalent amongst the study population. Severity of MSDs symptoms in descending order were; upper back pain; neck pain, lower back pains, shoulder pains and wrist/hand pains. Older people who had been driving for longer periods of time suffered the most from identified prevailing symptoms.

Majority of the CLDBDs 75(56.4%) were within the age bracket 40-49 years. 101(75.9%) of the Drivers were married. 71(53.4%) have schooled up to the basic education level. Majority of the CLDBDs 93(69.9%) have been driving for more than 6 years with 108(81.2%) covering over 500km per journey. 84(63.2%) of the CLDBDs did not smoke while 87(65.4%) were found to use alcohol. Most drivers 120(86.5%) did not engage in any form of physical exercise.

Self-medication was identified as the major form of treatment sought by the CLDBDs upon experiencing musculoskeletal disorders. Of the demographic factors studied, only number of years of driving commercial vehicle was found to be associated with MSDs at $\alpha = 0.05$; $p = 0.001$.

In a logistic regression analysis to investigate the association between MSDs and age of CLDBDs, it was revealed that an association existed between drivers aged 40 to 49 years and shoulder pain $p < 0.05$; CI [(0.007, 0.947)].

6.2 Recommendations

To test the beneficial effects of physical exercise on preventing musculoskeletal disorders in commercial Long Distance Bus Drivers, research is needed at four levels:

1. Epidemiological studies are needed to identify relationships between physical activity levels and driver stress, fatigue, sleep, health status, and accidents among specific subgroups of professional drivers (e.g., local bus drivers, long-distance coach drivers, company car drivers, etc.). An economic evaluation of the potential financial implications of physical inactivity among specific professional drivers would follow.

2. Intervention studies are needed to examine the effects of chronic exercise on driver performance in natural and controlled settings (e.g., using driving simulators), particularly for drivers who report high stress, poor sleep, and poor health status.

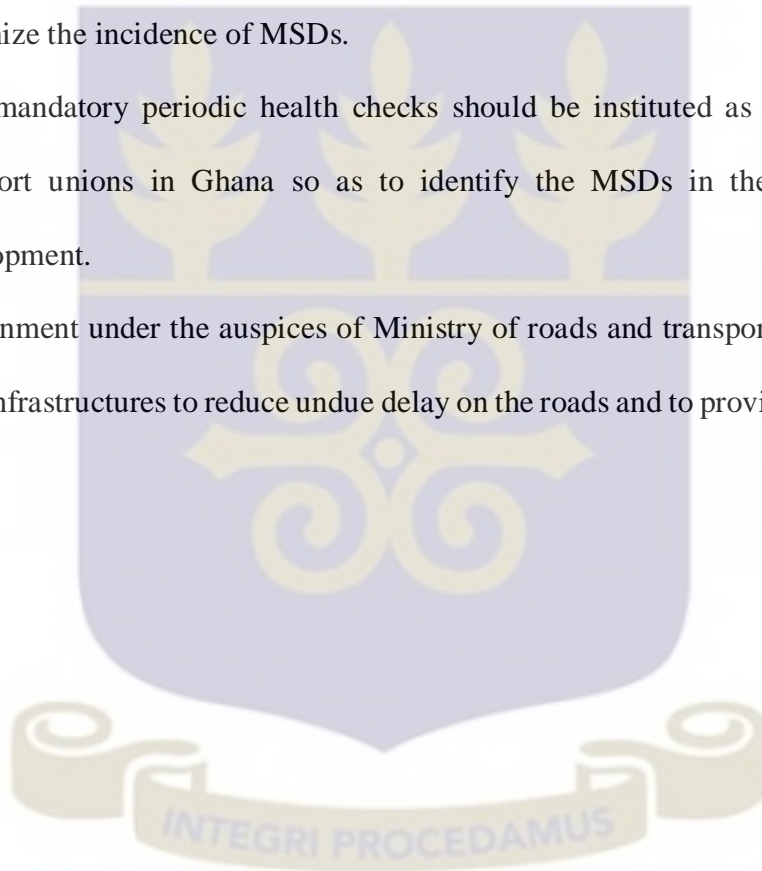
3. Studies are needed to examine the acute effects of exercise (in different doses, intensity, and duration, but particularly behaviour such as walking, which are convenient and likely to be adopted) on simulated driving performance, particularly among drivers who report high stress, poor sleep, and poor health status.

Ergonomic interventions that target bus trade companies must consider the needs of CLDBDs and apply a holistic approach in order to have an effect on bus drivers' health and work ability. Good co-operation with occupational health service personnel helps bus trade companies achieve their goals.

The following recommendations are also made:

- ❖ Longitudinal studies should be conducted with a larger sample to present a more reliable data on the extent of the problem.

- ❖ Health and safety regulation should be instituted and formalized by road transport unions in Ghana to cover all categories of drivers.
- ❖ There should be periodic meetings with the drivers to solicit health and safety concerns they encounter in the course of their work to enable management put appropriate measures to swiftly improve upon them.
- ❖ As a way of minimizing prolonged driving, shift driving cycle should be instituted so that every bus should have a co-driver who takes over at calculated intervals to minimize the incidence of MSDs.
- ❖ Also mandatory periodic health checks should be instituted as a policy by road transport unions in Ghana so as to identify the MSDs in the early stages of development.
- ❖ Government under the auspices of Ministry of roads and transport should improve road infrastructures to reduce undue delay on the roads and to provide ease of plying.



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APPENDICES

APPENDIX 1: Informed Consent form

Institutional Affiliation

Department of Biological Environmental and Occupational Health Sciences(BEOHS);
School of Public Health, College of Health Sciences,University of Ghana.

Background

Dear participant, my name is Mohammed ShabanOsumanu, I am a student of the school of Public Health, University of Ghana. I am conducting this study for a MSc. in Occupational Hygiene dissertation titled “Prevalence of Musculoskeletal disorders among Commercial Long Distance Bus Drivers in Greater Accra at the VIP Bus Services Terminal”. The purpose of the study is to determine the prevalence of musculoskeletal pains/symptoms among CLDBDs, identify risk factors for musculoskeletal pains/symptoms among CLDBDs, ascertain whether musculoskeletal symptoms among CLDBDs limit their daily activity and explore the treatment methods CLDBDs adopt to treat onset of MSDs symptoms in the course of their daily activity.

Procedures

The study will involve answering questions from a questionnaire. There will be no invasive procedure to take samples from participants. I will appreciate your participation in this study.

This is purely an academic research which forms part of my work for the award of a master’s degree.

Risks and Benefits

The study does not involve any biological sample collection from respondents and therefore will NOT employ any invasive procedure that will cause any discomfort to participants. It is hoped that the results obtained for this study will be used by policy makers to either improve upon existing occupational health and safety policies or to enforce existing ones with the objective of better protecting the commercial long distance bus drivers from occurrence of musculoskeletal disorders.

Right to refuse

Participation in this study is voluntary and you can choose not to answer any individual question or all the questions. You are at liberty to withdraw from the study at any time.

However, I will encourage you to participate since your opinion is important in determining the outcome of the study.

Anonymity and Confidentiality

I would like to assure you that whatever information you will provide will be handled with strict confidentiality and will be used purely for the research purposes. Your responses will not be shared with anybody who is not part of the research team. Data analysis will be done at the aggregate level to ensure anonymity.

Dissemination of results

The result of this study will be mailed to you if you provide your address below.

Before taking the consent, do you have any question you wish to ask about the study?

Yes

No (if yes, questions to be noted bellow)

.....

If you have questions later, you may contact Mohammed ShabanOsumanu on

0244677170 / 0207270577.

Consent

I....., declare that the purpose of the study have been thoroughly explained to me in English language and I have understood. I hereby agree to answer the questions

Signature.....

Date.....

OR

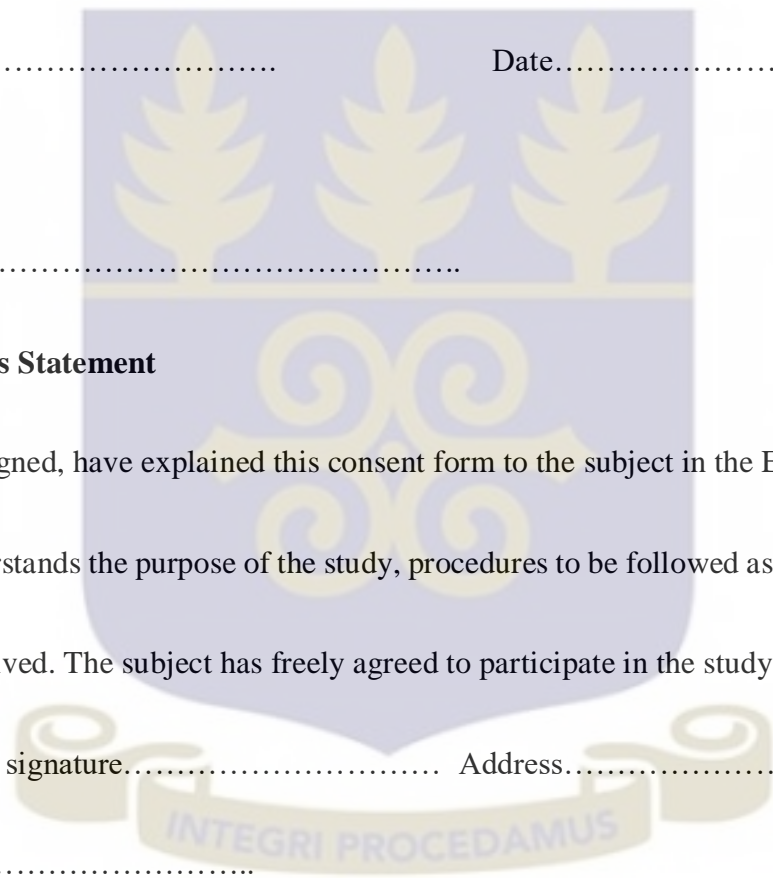
Thumb Print.....

Interviewer's Statement

I, the undersigned, have explained this consent form to the subject in the English language that the understands the purpose of the study, procedures to be followed as well as risks and benefits involved. The subject has freely agreed to participate in the study.

Interviewer's signature..... Address.....

Date.....



APPENDIX II: QUESTIONNAIRE

PREVALENCE OF MUSCULOSKELETAL DISORDERS AMONG COMMERCIAL LONG DISTANCE BUS DRIVERS IN GREATER ACCRA.

Dear participant, my name is Mohammed Shaban Osumanu; I am a student of the school of Public Health, University of Ghana. I am conducting this study for a MSc. in Occupational Hygiene dissertation titled “Prevalence of Musculoskeletal disorders among Commercial Long Distance Bus Drivers in Greater Accra at the VIP Bus Services Terminal”. The purpose of the study is to; determine the prevalence of musculoskeletal pains/symptoms among commercial long distance bus drivers, identify risk factors for musculoskeletal pains/symptoms among commercial long distance bus drivers and explore the type of health measures available to these commercial long distance bus drivers on the early onset of MSDs.

The study will involve answering questions from a questionnaire and will be much appreciative for your utmost participation in this study. All information provided will be handled with strict and absolute confidentiality and will be used only for the research purposes and nothing more.

SECTION A: RESPONDENTS BACKGROUND

1. Age (Years)

< 40 [] 40-49 [] 50+ []

2. Sex:

M [] F []

3. Marital Status

Single [] Married []

4. Level of Education

Junior Secondary []

Secondary []

None []

5. When did you start driving commercial vehicles (Years)?

< 6 years ago [] > 6 years ago []

6. Are you accompanied by any spare driver any time you are moving from Accra?

Yes [] No []

7. What distance (km) do you usually cover? is it a day or a week or a month?

< 500 km [] 500 km + []

8. Have you ever gone on leave since you started driving VIP Buses?

Yes [] No []

9. Do you Smoke? Yes [] No []

10. Do you consume alcohol? Yes [] No []

11. Do you get time to do any physical activities such as fitness or recreational activities?

Yes [] No []

SECTION B: RISK FACTOR (PHYSICAL)

Do you usually engaged in the following during your daily activity?

12. Prolong /stretch of hands/arms in excessive tightening /grasping of steering

Yes [] No []

13. Prolong Sitting whiles driving

Yes [] No []

14. Stretching of Foot on Brake, Accelerator etc

Yes [] No []

15. Sitting with back rounded or shoulder slumped forward

Yes [] No []

16. Holding the neck in a forward bent position for a prolong time

Yes [] No []

RISK FACTOR (PSYCHO SOCIAL)

How would you rate the following during your driving schedules?

High(Yes) &Low (No)

17. Driving Hours

Yes[] No []

18. Driving Fatigue/Stress

Yes [] No []

19. Social support (from supervisors/safety officers & co-workers)

Yes [] No []

20. Mental Condition


Yes [] No []

SECTION C: NORDIC QUESTIONNAIRE

21. Please answer by ticking the appropriate box (one tick for each question). You may be in doubt as to how to answer but do try and give out your best anyway. Answer any questions on each part of the body.

In this picture, you can see the appropriate position of the parts of the body being referred to in the questionnaire. Limits are not sharply defined and certain parts overlap. You should decide for yourself in which part you have or have had trouble (if any)



	Have you at any time during the last 12 months had trouble (such as ache, pain, discomfort, numbness) in:	During the last 12 months have you been prevented from carrying out normal activities (e.g. job, housework, hobbies) because of this trouble in:	During the last 12 months have you seen a physician for this condition:	During the last 7 days have you had trouble in:	
	NECK	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
	SHOULDERS	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
	UPPER BACK	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
	ELBOWS	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
	WRISTS/HANDS	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
	LOWER BACK	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
	HIPS/THIGHS	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
	KNEES	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
	ANKLES/FEET	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes

SECTION D: INFORMATION ON HEALTH SERVICES AVAILABLE ON

(PREVENTION & TREATMENT OF MUSCULOSKELETAL DISORDERS TO EMPLOYEE)

22. Does your company have a clinic facility where employee goes for medical treatment?

Yes []

No []

23. Have you ever received treatment from any health condition of your body before?

Yes []

No []

24. If yes, which of the following did you receive treatment for?

Low Back [] Upper Back [] Neck [] Shoulder []

Wrist/Hand [] Knees [] Ankles/Feet [] Hips/Thighs []

Elbows [] N/A [] [You can tick as many as possible

25. Where? Clinic [] Self Medication []

Medication [] Chiropractic [] Physiotherapy []

Herbal Medicine [] No Treatment [] Self Medication [] N/A []

Thank You.



Informed Consent

Voluntary participation

Your participation in this research study is voluntary. You may choose not to participate and may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study. No compensation expected for your participation (neither monetary nor any other incentive). However, your participation will be highly appreciated to informed policies regarding your work with VIP Bus Service and enable stakeholders within the transportation industry to formulate policies on occupational health and safety policy the commercial long distance bus drivers in the country.

Participant

I have read this consent form and have been given the opportunity to ask questions. I give my consent to participate in this study.

Principal Investigator Signature _____

Participant's Signature _____ Date _____

OR

Thumb Print _____

