

**THE EFFECTS OF OCCUPATIONAL SAFETY AND HEALTH ON
LABOUR PRODUCTIVITY: A CASE STUDY OF SOME SELECTED
FIRMS IN THE GREATER ACCRA REGION OF GHANA.**

BY

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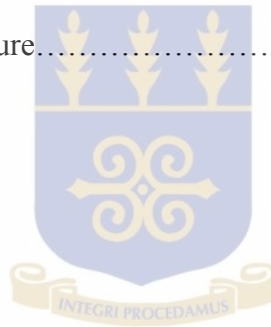
DECLARATION

This is to certify that this thesis is the result of research undertaken by Franklin Nkudefe Adjotor under supervision. References are duly acknowledged and that this work is entirely my own and that neither part nor whole is submitted for an award elsewhere.

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ABSTRACT

The countless incidences of injury, death, frequent absenteeism and huge compensation costs that characterized most Ghanaian industry are worries to the country's economic development. This draws from the fact that these negative implications of unhealthy and unsafe working environment continue to plague labour productivity in the country and have the tendency of retarding economic growth. At least 7 per cent of Ghana's GDP is spent on solving problems related to the improper management of health and safety. To effectively address this menace, the effects of the health and safety of an organisation on one's productivity need to be well known and understood.

Using primary data from firm survey in the Greater Accra region of Ghana, the univariate estimation technique was employed to access the impact of employees' health and the safety of an organisation on employees' productivity. The study further accessed the impact of health and safety on performance indicators like attendance, quality, quantity, concentration and efforts of employees. In order to avoid the use of several univariate estimations the multivariate estimation techniques was employed under this case.

Findings from the study indicate that health and safety are vital to one's productivity. The marginal impacts of health and safety on employees' productivity were 21 and 27 percent respectively. It was also evident that health and safety positively affect one's attendance, quality, quantity, effort and concentration levels at work. However, the health of the individual and safety of the organisation greatly affect one's quality of work and attendance respectively among the performance indicators. The results further indicated that the impacts of health and safety on labour productivity were not organisation specific. The study recommends that firms should

establish occupational safety and health offices that will ensure the wellbeing of their employees. Secondly health care incentives should cover all categories of workers; this is to offset constraints to health care demand. Finally there should be a system that evaluates, monitors and controls risk at work places in order to reduce the decline in productivity associated with any kind of risk.



DEDICATION

This work is dedicated to the Almighty God, Whose grace and love has brought me this far.



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I firstly thank the Almighty God, who constantly provided me with the needed strength to pursue this programme. Lord I am very much grateful. My special thanks and appreciation go to Dr. A.D.A Laryea and Dr. William Bekoe who showed great commitment and interest in this work and guided me accordingly for this work to become reality and also to Mr. Tsyawo Emmanuel Selorm for his useful comments and corrections. One thing I ask for them is that they will forever and ever enjoy the Lord's favour.

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I hereby declare total responsibility for any errors, omissions or misrepresentation that may be found in this work.

Mr. Adjotor, Nkudefe Franklin

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LIST OF ABBREVIATIONS

GDP	Gross Domestic Product
ILO	International labour Organisation
OSH	Occupational Safety and Health
WHO	World Health Organisation
WHS	World Health Statistics

CHAPTER ONE

INTRODUCTION

1.0 Background of study

About 6,300 people die every day, more than 2.3 million deaths per year occur and 317 million accidents occur on the job annually due to poor health and safety policies at work (ILO, 2003). Many of these result in significant human losses, loss in productivity and an economic burden not only on the victim but on the nation at large. Globally, 4 percent of Gross Domestic Product (GDP) is lost as a result of poor health and safety measures at work which is just the direct cost associated with unsafe and unhealthy work environment. Indirect cost is empirically believed to be about two to three times the direct cost associated with these unsafe and healthy work practices which could raise the global percentage of GDP lost (ILO, 2003).

The International Labour Organization (ILO, 2003) defines occupational health and safety (OHS) as the outcome of adequate protection of a worker from sickness, injury and disease arising from work. The ILO embraces the idea that workers' points of view need to be heeded and given equal status with those of other stakeholders in the workplace in ensuring sound business development. Health and safety in the workplace is essential for ensuring that people are not harmed during work, and that pain, suffering and loss of life are avoided. Ensuring that people are not injured can extend the productive working lives of citizens and contribute to economic growth and prosperity. The benefits of promoting occupational health and safety include enabling people to live happier and longer lives, enhancing economic activity, reducing demand on health and social services and reducing the costs associated with illness and injury on both individual and community bases (Cudjoe, 2011 and Bennet, 2011).

Improving occupational health and safety is in the best interest of all but before the formulation of policies on occupational safety and health by the international labour organization (ILO). In 1959, employers were not much concerned about the health and safety needs of their workers (Cudjoe, 2011). Safety and health policies were not provided by employers and most employees sustain several degrees of injury during working activities. An injured worker sometimes had to file for compensation which in most cases was not successful and even the cost of doing so prevented most injured employees from pursuing such matters in court. However, in 1959, ILO made certain recommendations about the establishment of occupational safety and health service in firms which seek to promote the health and safety concerns of employees. Recommendations like protecting the labour force against any form of health hazards and contributing towards workers' physical and mental adjustment are among those made to protect employees.

In Ghana, the health and safety of employees is protected by the Ghana labour Act (Act 651, 2003). It places the safety of employees under managements and employers' supervision by stating that "it is the duty of an employer to ensure that every worker employed by him/her works under satisfactory, safe and healthy conditions". The act fails to specify the appointment of safety and health officers in organizations and hence most firms do not have safety directors who monitor and evaluate hazards that threaten the health of workers and hence this accounts for the numerous incidences of occupational injury.

Institutions like the Trades Union Congress (TUC) exist in Ghana; one of its objectives is taking health and safety initiatives and the formation of employee unions within organizations in order to improve the quality of working life of employees. The TUC like any other Trade Union generally influences occupational health and safety outcomes in several unique ways through the provision of job hazard information. It sometimes protects workers who refuse to accept

hazardous assignments, and it offers assistance and representation for workers in accident compensation claims. They do this by pressurizing employers for better programs and using their power to lobby for legislations to improve the health and safety of employees. Besides the regulatory process and its enforcement, the TUC does bargain for the acquisition of protective equipment, payment of compensatory wages and the establishment of joint union-management health and safety committees (Gomez, 2011).

Occupational safety and health is often evaluated by the extent of injury and fatality sustained by employees in an organization. Costs associated with injury and fatality also give another way of evaluating the effectiveness of employees' safety. The costs in insurance premiums, lost wages and lost productivity create a substantial financial loss to businesses (Cudjoe, 2011).

A study by Piavi et al, (2008) reveals that in Ghana due to poor health and safety practices 1,852 fatalities were recorded in 1998 and this rose to 9,661 cases in 2005. The rate of fatal injuries was 20.6 (per 100,000 workers) in 1998 and this went up to 23.6 (per 100,000 workers) in 2003. They also reported about 1.4 million days of absenteeism in 1998; Ghana was the 6th highest in the African region. In 2003 absenteeism in Ghana increased to about 2.3 million days, thus elevating Ghana to the 4th highest in the Africa region. These levels of absenteeism have serious repercussions on the economy, firstly affecting the productivity of the individual at the level of the firm and finally the entire economy. Also according to Mock et al (2005), unsafe and unhealthy work environment can be very burdensome on Ghanaian workers due to the mismatch between the average cost of treatment and their average earnings.

The cost of occupational injury, illness, and fatality is an issue of concern that the Labour Act needs to address. This concern is a public health issue that goes beyond the injured employee to affect the entire society. When the employees' ability to earn is disrupted by an event such as

workplace injury or death, the financial stability of the family is seriously threatened. Once self-sufficient individuals and families lose their ability to earn and to provide support, they become dependent on government services and public assistance for health care, housing and food. Direct costs such as replacement of lost wages and medical bills are insured and are well documented. However, indirect and opportunity costs such as lost hours of production, years of work, ability to earn and the hardship placed on the injured employee and his/her family are great and are not measured. Preventing workplace injuries has the potential to save the injured from countless days of pain and suffering.

Health of employees is therefore becoming a top priority in the labour market. This is possibly due to the link between health and productivity of employees. Health is now considered by both labour and health economists as a business factor “both in terms of cost and from an assets perspective” (Kirsten, 2010, pp.1). Workforce productivity is very crucial in the sustainability of all organizations and firms; health of employees should be incorporated into goals and mission set by managers in organizations since it is a business factor (Koopman, 2002). For this reason ILO requires that member countries should have safety and health management systems that will protect and promote the health of workers, through the minimization of work hazards. Such safety measures promote safe and healthy work environment and also makes employees enjoy good health in order to be socially and economically productive (Ezzedine, 2008).

The health and safety of an employee should not be overlooked in the determination of how productive workers are, since human capital is key in firms’ productivity. Therefore it must be noted that safety and health legislation, change in attitude (both employer and employee) towards safety and health issues in an organization when set as a priority will improve productivity, since “safe work means safe business” (ILO, 2003).

1.1 Problem statement

The countless incidences of injury, death, frequent absenteeism and huge compensation costs that characterized most Ghanaian industries are worries to the country's economic development. This draws from the fact that these negative implications of unhealthy and unsafe working environment continue to plague labour productivity within the country and have the tendency of retarding economic growth in the long run. At least 7 per cent of Ghana's GDP is spent on solving problems related to the improper management of health and safety (Annan, 2011). This includes dependence on government services for health care, housing and food, since the ability of injured workers to afford these needs is disrupted. Hence, the negative implications that emanates from unsafe and unhealthy works when not addressed will reduce labour productivity in the long run.

In addressing this menace, attention has mostly been drawn to the extent of injury and fatality sustained by employees and in other cases the evaluation of costs associated with these injuries and fatalities. However, in order to effectively address this menace, the effects of the health and safety of an organisation on one's productivity need to be well known and understood. This will facilitate the implementation of policies to curb this menace.

The extent of the effects of health and safety on labour productivity across industries in Ghana still remains inconclusive since available works basically analyse the impact on individual industries. For instance, Danso et al. (2010) considered the impact of unsafe work conditions on workers in construction industries in Kumasi by estimating the number of fatalities that do occur. Moreover, other studies such as Mock et al. (2005), Ametepe (2011) and Annan (2011) are either in the form of cost calculation or reportage without in-depth analyses. To ensure the well-being of workers, the extent of these unsafe and unhealthy conditions on labour productivity also needs

to be known. This study therefore attempts to bridge this gap by providing an in-depth knowledge of the effect of health and safety on employees' productivity in Ghana.

1.2 Research questions

- What is the effect of health and safe work conditions on labour productivity?
- To what extent do health and safety affect employees' performance at the work place?
- Do these effects on labour productivity really differ across different firms?

1.3 Research objectives

The following outlined objectives will permit us to address the abovementioned research questions:

- Determine the relationship between labour productivity and the health and safety status of employees.
- Determine the extent to which health and safety affect one's performance by way of assessing the impact on attendance, quality, quantity, effort and concentration levels at the work place.
- Determine the significance of the effect of health and safety on labour productivity across firms.

1.4 Significance and Justification of study

The justification of this study lies in its intention to highlight the vital contribution of health and safety to the productivity of the workforce via the estimation of the marginal effects of health and safety on employees' delivery capacity. Thus, it intends to move away from the estimation of the number of incidences of injury, the amount of compensation paid and the loss in productive hours; a concept on which most occupational safety and health research works are based. The significance of this is to provide the basis for the formulation of an effective health and safety policy which addresses specific health and safety needs that will ultimately boost the performance of the work force of any country, most especially Ghana. The study could also serve as a reference material for either decision makers of health and safety policies or students in academic research.

1.5 Organization of study

The study will be organized in six chapters, chapter one focuses on the introduction of the study. Chapter two discuss the overview of occupational safety and health in Ghana. Chapter three will consist of literature review, both theoretically and empirically. Chapter four will be the theoretical framework and methodology section of the study, presentation and discussion of results will constitute the fifth chapter of the study. Finally the sixth chapter comprises the summary of the whole work, conclusion and possible recommendations to promote safety.

CHAPTER TWO

OVERVIEW OF OCCUPATIONAL SAFETY AND HEALTH IN GHANA

2.0 Introduction

This chapter firstly presents the current state of occupational safety and health in Ghana; this is then followed by conventions on safe and healthy work in Ghana.

2.1 Current states of occupational safety and health in Ghana

Health and safety indicators in Ghana have not improved despite the vigorous measures taken by the government and non-governmental organizations to address these challenges over the past few decades. A common indicator of health is life expectancy. In 2010 the average life expectancy of a Ghanaian was 60.0 years (WHO, 2011), albeit greater vis-à-vis the 2003 estimate of 58 years. This figure is about 10 percent below the world health average and it is ranked the 151st out of 194 member countries whose data are available. Averagely, females have higher chances of survival than their male counterparts. In 2010, females had a life expectancy of 60.5 years compared to the 59.6 years of men in Ghana. Life expectancy in a country is very significant to its socio-economic development, since high life expectancy is empirically proven to increase the human capital of a nation. This is associated with high income per capita which eventually leads to higher economic growth. Also, according to the World Health Statistics, just about 13 percent of the Ghanaian population in 2008 lives or works in a safe environment. Those in urban areas were much safer than their rural counterparts (World Health Statistics, 2011). This

level of safety has the propensity to affect the economic development of the country since unsafe work does not foster safe business (ILO, 2003).

According to Annan (2011) the growth rate of organizations in Ghana has increased over the past few decades. For instance, the business entry rate in 2002 was 5.93 percent and that in 2003 was 6.17 percent (www.tradingeconomics.com). One reason for this growth is the improvement in the socio-economic stability of the nation which in turn aims at achieving the middle income objective. The absorption of the labour force into the labour market and the improvement in the standard of living are other reasons which could be attributed to the growth rate of firms in the country. This growth rate in firms has brought about the exposure of a large percentage of the Ghanaian workforce to several health and safety challenges. This is primarily due to poor handling, monitoring and evaluation of health and safety hazards. For instance, the mortality rate has increased from 271(per 1000) in 1990 to 317(per 1000) in 2007 (world health statistics report, 2006 & 2011) among the working class of Ghanaians. Mortality as a result of injury was 97 (per 100,000 persons) in 2002. This figure represents a mortality rate of 10 percent. In 2004, life lost as a result of injury was 80 per 100,000 persons representing 7 percent of total mortality cases. Thus; this represents a drop in what was recorded 2 years ago. This figure increased in 2008 with 91 cases per 100,000 persons representing 9 percent mortality rate (world health statistics, 2011).

According to the Ghana Health Service, the disease profile of Ghanaians is predominantly characterised by high levels of communicable diseases and a rising incidence of non-communicable diseases across all age groups. With the current top ten morbidity cases, the share of communicable diseases is 89.2 percent and that of non-communicable diseases is 10.8 percent. These estimates are based on outpatient attendance and as such, are likely to be higher than what

is reported. According to Ametepe (2011), communicable diseases like; schistosomiasis, malaria and HIV/AIDS and non-communicable diseases like chemical poisoning, stress and asthma are predominant among Ghanaian workers.

Currently, the occupational injury rate in Ghana is reported to be 11.5 per 1000 in the urban areas and 44.9 per 1000 in the rural areas (Ametepe, 2011). Injury is the sixth highest morbidity case facing Ghanaians with a value of 2.3 percent of the total morbidity cases in the country (Ghana Health Service, 2005). Also, the Ghana Health Service reports that accidents are the predominant form of mortality among the working group. For the age group 15-44, accidents (occupational or domestic) are more frequent for males than for females. For those in the age group 45-60 years, accidents are equally predominant for both sexes. Besides that, males in this group have a high incidence of hypertension while osteoarthritis is common among females. Occupational injury leads to higher mortality rates, longer disability and higher treatment cost (Ametepe, 2011). Occupational injury causes a lot of growth drag in the economy; this is because with the current low level of GDP and high dependence on foreign partners, the cost of occupational injury to the state amounts to about 7 percent of the total GDP (Ghana News Agency, 2003).

The high level of injury can be attributed to the rising number of physical, chemical, biological and psychological stressors associated with working activities in the country (Annan, 2011). This in turn can be attributed to the fact that the Ghana Labour Act fails to identify an agency which is solely responsible for anticipating, monitoring, evaluating, controlling and preventing hazards that could affect the welfare of workers. Furthermore, there is no policy and guidelines on occupational health and safety by which workers can be protected (Ghana Health Service, 2005).

However, there are two main statutes in Ghana which provide guidelines on a healthy and safe work. These are the Factories, Offices and Shops Act, 1970 (Act 328) and the Mining Regulations 1970 LI 665. However, these acts are limited in scope taking into consideration the multifaceted nature of organisations in the country. The Workers Compensations Law 1987 (PNDC 187), the Radiation Protection Board, the Environmental Protection Agency and the National Road Safety Commission are other statutes which indirectly promote occupational health and safety in the country.

2.3 The Ghana Labour Act

The Ghana Labour Act (Act 651, 2003) stipulates that every employer is mandated to;

- Provide and maintain at the workplace, plant and system of work that are safe and without risk to health.
- Ensure that safety and absence of risks of health in connection with use, handling, storage and transport of substances.
- Provide the necessary information, training and supervision with regard to age, literacy level and other circumstances of the worker to ensure the health and safety at work of other engaged workers.

The government of Ghana in ensuring the safety of its workforce imposes fines and sanctions on all employers who fail to adhere to the above law. It makes it emphatically clear in the labour act that any employer that fails (without reasonable excuse) to fulfil any of the obligations commits an offence and is liable to an instant fine not exceeding 1000 penalty units or imprisonment of a term not exceeding three years or both (Ghana labour Act, 2003 and Cudjoe, 2011).

Such measures by the government show its level of commitment to the observation of the national targets and indicators set by the International Labour Organization of which Ghana is a member. These targets are as follows:

- Improved policies, legislation, coverage (legal, inspection, compensation, occupational health service)
- Availability of occupational health services
- Improved safety and health infrastructure and qualified manpower
- Better statistics, higher visibility on safety and health
- Establishment of advisory bodies and voluntary mechanisms
- Targeted national programme using measurable indicators

2.4 Ghana's Factories Offices and Shops Act (1970)

This act was passed into law in 1970 by an act of parliament in order to regulate activities in the formal sectors of employment in Ghana. It mandates every employee either in factories, offices or shops to have access to the act and to adhere to what is stipulated in it. It aims at reducing risk and injury and at safeguarding workers at their respective roles through the notifications it provides. It also spells out what needs to be done should any accident occur at work and the sanction to be imposed on the employer should an accident occur. For this reason, the act appoints chief safety inspectors who have the power and mandate to ensure the safety of workers in Ghanaian factories, offices and shops. Below are some obligations of the chief inspector:

- To enter, inspect and examine, by day or by night, a factory and every part thereof, when he has reasonable cause to believe that any person is employed there in, and to

enter, inspect and examine by day any place which he has reasonable cause to believe, to be a factory, office or shop, and any part of any building of which a factory, office or shop forms part and in which he has reasonable cause to believe that explosive or highly inflammable materials are stored or used.

- To take with him a police officer if he has reasonable cause to expect obstruction in the execution of his duty
- To require the production of the registers, certificates, notices and documents kept in pursuance of this Act and to inspect, examine and copy any of them.
- To make or cause to be made such examination and inquiry as may be necessary to ascertain whether the provisions of this Act and of the enactments in force relating to public health are complied with so far as it respects a factory, office or shop and any persons employed therein.
- To require any person who he finds in a factory, office or shop to give information
- To examine or cause to be examined any person, either alone or in the presence of any other person, as he thinks fit, with respect to matters under this Act.
- In the case of an Inspector who is a registered medical practitioner, to carry out such medical examinations as may be necessary for the purposes of his duties under this Act; and
- To exercise such other powers as may be necessary for carrying this Act into effect.

2.5 Ghana's Mining Law 1970 LI 665

This act, just like the factories act is to safeguard workers at the mining industries. This act was passed into law by the government of Ghana in 1970 to regulate the activities in the mining industries. It also makes certain provisions that will also safeguard inhabitants (both human and animals) that live very close to mining areas. The act stipulates benefits to be paid to owners of the land when such mining activities are even over. It does this by stating that “further work however needs to: establish clear guidelines to ensure that land owners and local communities benefit from assets remaining after mine closure”.

With regard to policies which will protect the health and safety of workers through the prevention of the different kinds of hazards associated with mining activities, it stipulates the following:

Mining companies will be required to put in place adequate and effective measures to ensure the achievement of the standards so established. To this end:

- All companies shall conduct risk assessments to identify the various hazards inherent in their operations, rank these risks and ensure that effective controls are put in place to ameliorate the risks.
- Mining companies shall support this with training and re-training of the employees in matters of safety
- Ensure that mining companies show commitment to comply with environmental, occupational health and safety standards through the implementation of appropriate health and safety programmes
- Establish accountability for all employees to exert leadership and commitment to continual improvement in environmental, occupational health and safety awareness

2.6 Environmental Protection Agency Act 1994 (act 490)

This act, unlike the ones above goes beyond the protection of the health and safety of workers. It protects the health and safety of all people by basically providing policies that will eliminate, reduce and control the emission of pollutants into the environment.

It does this by issuing permits and abatement notices to bodies and organisations whose activities emit substances that are harmful. It also issues notices in form of directives, procedures or warnings to such bodies with the aim to control the volume, intensity and quality of noise in the environment. Moreover, it prescribes standards and guidelines relating to the pollution of air, water, land and other forms of environmental pollution including the discharge of wastes and the control of toxic substances. These stipulations aim at ensuring a quality environment that promotes the betterment of people's health and safety.

The act also ensures the appointment of environmental safety officers whose primary obligation is to enter any premises at any reasonable time for the purpose of ensuring compliance with this or any other law pertaining to the protection of the environment and shall, if required to do so by the person in charge of the premises, produce his proof of identity to the person.

Obstructions to duty is an offence and the offender shall be liable to summary conviction to a fine not exceeding ₵500,000 or to imprisonment not exceeding six months or to both.

2.7 The Ghana National Health Policy (2007)

This policy was written by the Ghana Health Service in conjunction with the government of Ghana. The policy is themed "creating wealth through health". The basic reason for this policy is to increase the productivity level of workers in the country in order to achieve the middle income

status. This comes as a reason that good health is recognised as intrinsically desirable and a necessary ingredient for socio-economic development. Hence, it is not surprising that the mission for achieving this policy is to contribute to socio-economic development and wealth creation through promoting health and vitality, ensuring access to quality health, population and nutrition services for all people living in Ghana and promoting the development of a local health industry.

Objectives of this theme are:

- To ensure that people live long, live healthy and productive lives and reproduce without an increased risk of injury or death
- To reduce the excessive risk and burden of morbidity, mortality and disability, especially among the poor and marginalized
- To reduce inequalities in access to health, populations and nutrition services and health outcomes

These objectives and other principal guiding policies aim at improving the health and safety of both workers and non-workers in the country.

2.8 The Workmen's Compensation Act 1987 (PNDCL 187)

This act was passed into law in order to offer compensation for injury and death resulting from unsafe and unhealthy work environment.

The act stipulates various liabilities that the employer needs to offer to either the employee in the event of occupational injury or to the employee's dependents in the event of death of the latter. It does this by stating that:

- Where an employee sustains personal injury by accident arising out of, and in the course of employment, the employer is liable, subject to this Act, to pay compensation in accordance with this Act.
- An injured employee shall not suffer a diminution in earnings while the employee undergoes treatment for injury sustained through an accident arising out of, and in the course employment.
- Where an attending medical officer assesses an incapacity in respect of an injured employee, the employer shall pay the injured employee compensation commensurate with the incapacity so assessed

The act however prevents the payment of compensation to either the employee or his/ her dependents in the case where he/she is found to be under the influence of drugs or drinks at the time of the incident.

Compensations for injury and death can only be claimed upon prior notification. The act clarifies this by stating that:

- Unless notice of the accident has been given by, or on behalf of, the employee within six months after the happening of the injury and before the employee has voluntarily left the employment in which the employee was injured, and
- Unless the application for the compensation with respect to the accident has been made within six months or, in the case of death, within six months from the time of death.

2.9: Conclusion

In conclusion the current state of occupational safety and health in the country needs a critical look owing to the large number of fatalities, death and cost in terms of loss in productivity. Although it seems that there exist policies, laws and bodies in the country that address negative health and safety work condition, these according to Annan, (2011) are underperforming due to the lack of resources. Besides, this challenge is peculiar to certain kinds of occupations.

CHAPTER THREE

LITERATURE REVIEW

3.0 Introduction

This chapter provides a theoretical and empirical review on the concept of occupational safety and health and labour productivity. The essence of this chapter is to review studies conducted by researchers under this area and possibly identify issues that are left out and how this study can fill those gaps.

3.1 Theoretical review

3.11 The concept of employee's health

According to the World Health Organization (WHO), health is the state of complete physical, mental and social well-being of an individual.

Health economist such as (Grossman (1972)) predicts that every individual maximizes his/ her health by the consumption of health care. An individual is regarded as both a producer and consumer of his own health and not only a consumer of health. Grossman developed the model of health production in an inter-temporal consumption framework, where an individual consumes health in the present period and invests in health for future purposes. Health is described as a highly valued asset which appears to be the object of priority on the scale of preference of most people and also a prerequisite for other activities. "Health is not everything in life, but without health life is nothing" (Zweifel et al. 2009). An individual is considered as the producer of his own health since illness heals spontaneously and every healing process ultimately starts with the

psyche and body of the individual and not necessarily by a physician or the consumption of any medicine or drug.

In the production of health unlike the production of other economic goods, there is lack of complete control over the production process since there is no “systematic relationship between the inputs and the outputs” (Zweifel et al. 2009). There is also a lack of tradability in health production. This is unlike an agricultural production process or any form of organized production process where outputs are sold to a third party. However, health production is similar to other forms of economic production since there exist optimality conditions in production. This comes with cost and such costs are comparable to the marginal cost of producing other goods. Also, in an optimal state, the marginal cost of health is relative to the marginal cost of health production which is also relative to the marginal willingness to pay for health care relative to consumption. Finally, health production has a relative marginal productivity of inputs and there is an efficient utilization of health care resources (Zweifel et al. 2009).

Human capital is vital in any production process. Traditional human capital has been interpreted as education and skills of the individual neglecting the health component of the individual (Tompa, 2002). Health is a significant component of human capital since without it other components of human capital cannot be achieved (Zweifel et al. 2009).

Improvement in the health capital increases one’s level of productivity in both market and non-market activities. This according to Currie and Madrian (1999); Tompa (2002) and Grossman (1997) is an important input in the productivity of an organization. Bloom and Canning (2002) outlined four means by which the impact of health on productivity can be observed. A healthy labour force will record low levels of absenteeism at work and this will translate into higher volumes of productivity. Longevity among workers will motivate them to invest more in

education and hence receive higher returns on their investment. Also with longevity, individuals will be motivated to save in order to accumulate more physical capital for retirement. Improved survival rate will increase labour force participation. This would result in an increased per capita income if these individuals are accommodated in the labour market.

Harris, (1999) among other economists in finding better understanding of the determinants of productivity in an economy, stressed the importance of human capital as a determinant. Romer (1986) for instance in addressing the limitations in the growth model developed by Solow (1956), augmented Solow's model with human capital. This accounted for the amount of output growth not explained by the growth in the key inputs (i.e. labour and physical capital). According to Tompa, (2002), this augmented Solow model captures two dimensions showing the impact of health on productivity; the direct impact on the production process through the reduction in incapacity, disability and days off due to illness and the spill over impact of health on productivity.

Moreover, there is a growing interest about the linkage of health and economic growth. For instance in 1996 Barro, in throwing light on the issue of linkage commented that health is an engine of economic growth. His comment came as a result of identifying health as a capital productive asset which determines the human capital component in the human augmented Solow model. Mushkin (1962), however, dwells on the earning of future returns of the investment in human capital to establish this linkage.

3.12 The concept of organizational health

Organizational health refers to an organization's ability to achieve its goals based on an environment that seeks to improve organizational performance and support employee well-being (Alman, 2010).

Organizational health is made up of two aspects; employee well-being and organizational performance. Although they are independent variables, they influence each other and gain from each other. This in turn affects the organization's ability of achieving its goals through the interaction between these two variables.

Employee well-being

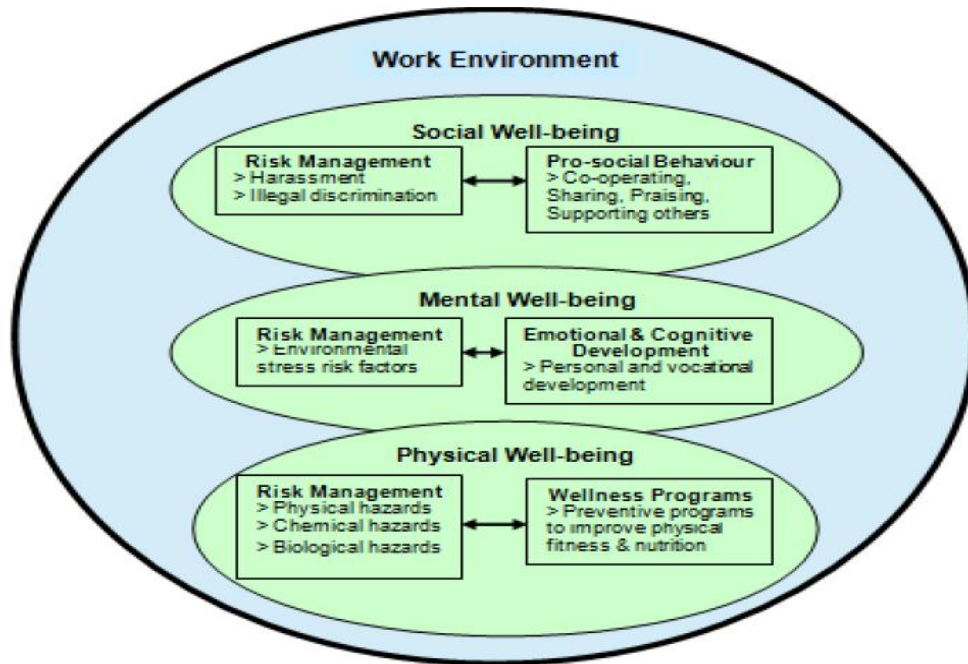
It refers to the structures in an organization which address matters relating to employee satisfaction and employee health (physical, mental and social) improvement.

The aim of employees' health is the promotion and maintenance of the highest degree of physical, mental and social well-being of workers by departure from health and controlling risks (ILO & WHO).

These aims highlight three aspects, these include:

- Well-being described as physical, mental and social
- Well-being involving the promotion, maintenance and prevention of departures
- The controlling of risks that could interfere with the well-being of workers

These three aspects of employee well-being are interrelated with each other; this interrelation is shown figure 3.1.

Figure 3.1: The generic human activity system

Source: Alman (2010)

The above figure illustrates how the component of employee health is addressed through the risk management approach to work environment hazards and additionally addressing personal health hazards. These are done through wellness programs which improve employee physical health, an emotional and cognitive development program addresses the mental resilience of the employee and a work culture encourages social relationships among employees. These ensure the improvement of the well-being of workers in an organization.

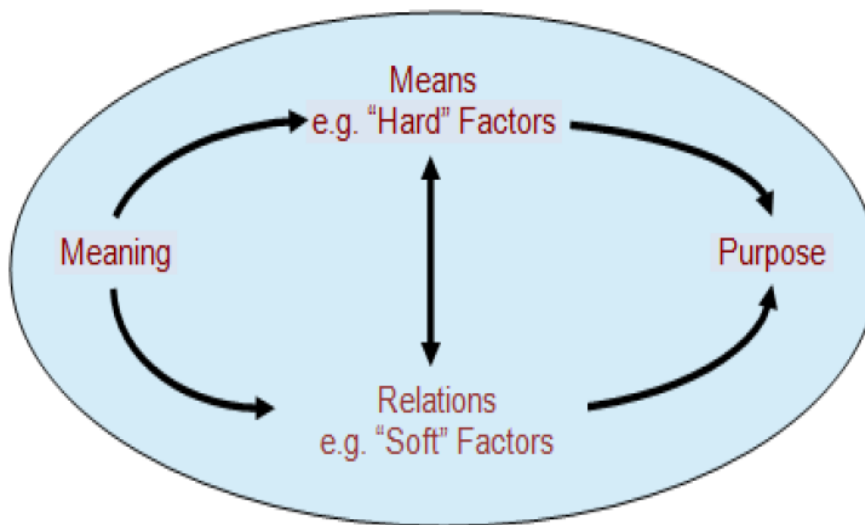
Organizational performance

Organizational performance is the application of a system thinking approach to the process and roles in an organization (Alman, 2010). The system refers to any group of interacting,

interrelated, or interdependent parts that forms a complex and unified whole that has a specific purpose (Kim, 1999). These address factors that affect an organizations ability to perform.

According to Alman, (2010) an organization health is dependent on an organizations performance. This is illustrated in figure 3.2 below as developed by Alman.

Figure 3.2: Model of organisation performance



Source: Alman (2010)

The “purpose” component of the above model refers to the goals, aims, outcomes and results. The “means” component refers to the “hard” factors in an organization. Aspects like accountability, reporting structure, coordination and control in an organization structure is regarded in the model as “hard” factors. The “relation” component of the model comprises of the “soft” factors like direction, capability and cultural values in an organizational structure. The final component comprises the norms, attitudes and assumptions underlying an organizational cultural.

The system illustrates the dependence of an organization's health on the performance of the organization. It does these by highlighting two kinds of systems which are determinant in an organization health. These are the thinking system which focuses on the improvement of interactions affecting performance, productivity and employee well-being and the management system; which focuses on designing, managing and controlling prescribed processes upon which the organization seeks to achieve its goals. This is what an organization health seeks to achieve, hence although a component of an organization's health, it is a determinate of an organization's health.

3.13 The concept of organizational safety

According to the ILO, (2003) safety in an organization goes beyond wearing safety helmets or safety clothing. It is a philosophy that identifies and eliminates hazards associated with work. It discourages work habits that place individuals at risk of injury.

A successful safety program should firstly change the perception of both employees and employers that safety refers to the elimination of injury, instead of the prevention of illness, property damages and the promotion of healthy life styles (Annan, 2011). A safety program should also incorporate the organizational structure, culture and processes since these play important roles in forming the attitudes and perceptions of workers.

Safety in an organization is also known as safety culture according to Cooper, (2002). This appeared first in the OECD Nuclear Agency report in 1987. Safety culture is loosely used to describe an atmosphere in which safety is understood to be, and accepted as, the top priority in an organization. Safety culture is a ubiquitous concept, since it is difficult to truly describe its

conception. For instance Turner, et al (1990), described a safety culture as a set of beliefs, norms, attitudes, roles, social and technical practices that are concerned with minimizing the exposure of employees, managers, customers, and members of the public to conditions considered dangerous or injurious in an organization. Uttals (1983) defined the concept of safety culture as “shared values (what is important) and beliefs (how things work) that interact with an organization’s structures and control systems to produce behavioural norms (the way we do things around here). On the other hand the ACSNI (1993) gave "the product of individual and group values, attitudes, competencies and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organization’s health and safety programmes" as the concept of safety culture. This ubiquitous concept of safety in an organization can be attributed to two main reasons: different researchers emphasize different elements of safety culture as most salient and the culture of any kind is an extremely difficult concept to succinctly define (Yule, 2003). Despite this ubiquitous nature, according to Reason (1998), it is an important concept whose time has come to address productivity losses attributed to injury in organizations.

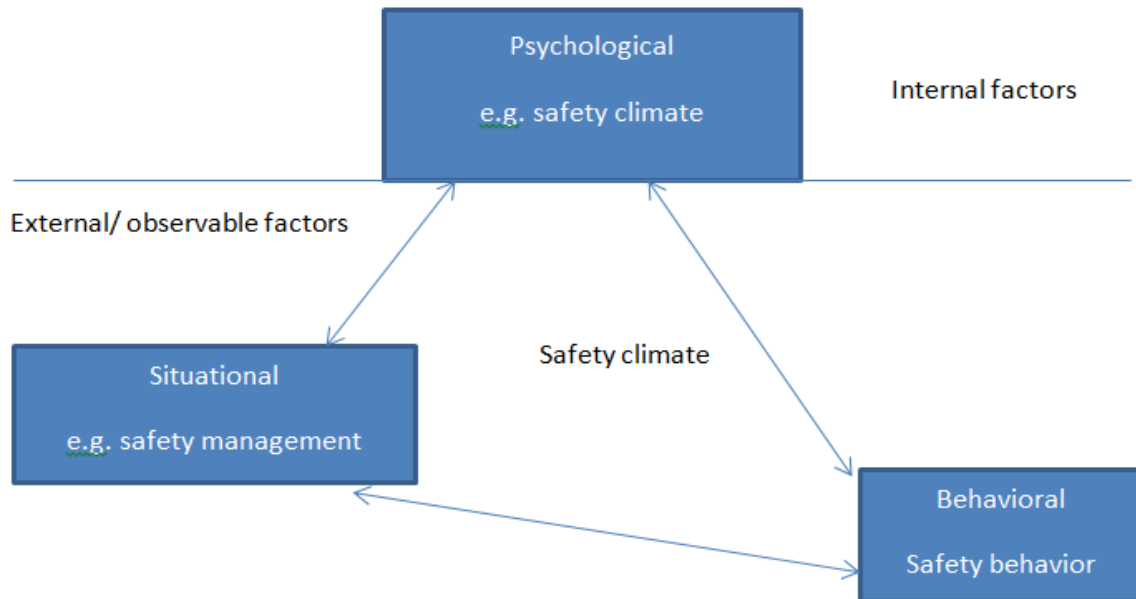
A safety culture is characterized by communication founded on mutual trust and a shared perception of the importance and confidence in the efficacy of preventive measures (Cooper, 2002). Reason, (1997), as referenced by Hudson, (2010) identified elements that constitute a safety culture. These are:

- An informed culture: - it refers to the situation where there is always current knowledge about the human, technical, environmental factors that determines the safety in an organization.
- A reporting culture: - this refers to an environment where one is at liberty to freely report errors and misses at the work site.

- Flexible culture: - it refers to an environment where safety measures are not static but do take different forms as to which to address a specific safety need.
- A learning culture: - it refers to the act of willingness and competence to draw right conclusions from safety information systems and the will to implement major reforms when the need arises.

According to Cooper, (2002), Hudson, (2010), there is no universally accepted model for safety culture in an organization. What is required is a conceptual model that facilitates the development of safety measures that are necessary in an organization. The Bandura's reciprocal model is what has been intensively be used in describing what a necessary safety culture in an organization needs to look like.

The Bandura's model is a psychological model that reflects a wide range of safety related evidence. It reveals a dynamic reciprocal relationship between psychological, behavioural and situational factors in the organization culture. The model is a derivation from the Social Cognitive Theory and it incorporates the ideas of cognitive based antecedents, self-evaluation rewards and the use of observable variables for assessment purposes. Figure 3.4 is the Bandura's model of reciprocal determination illustrating how an organization safety culture looks like.

Figure 3.3: The Bandura's model of reciprocal determination

Source: Cooper (2002)

The model basically consists of 3 main components, which are interlinked in a bi-directional way. The model provides an integrative way of thinking about how many processes could impact on the safety culture in an organization. It also gives a set of measurement tools that do not depend solely on incident or accident indices. The model has a dynamic framework that provides the means with which an organization is able to analyse the safety culture concept in order to identify the existence of any cause-effect relationship.

3.14 The Concept of labour productivity

According to Mostafa, (2003) labour productivity is the value of production added that each worker generates. Thus labour productivity equals the value of production divided by labour

input. Labour productivity is usually used as a measure of efficiency in every kind of firm since it is much easier to find its numerical estimates as compared to other determinants of productivity (Mostafa, 2003).

Productivity is a major concern for any kind of organization. Productivity represents the effectiveness and efficient way an organization is able to convert its resources into marketable products. The word productivity has been coined by several groups of scholars right from the 18th century. For instance, Davis, (1955), defined productivity as “a change in product obtained for the resources used”. The International Labour Organization (ILO, 1995) on the other hand defined productivity as “a comparison between how much one puts into projects in terms of manpower, material, machinery or tools and the result one gets out of the project”. The Japanese National Productivity Centre described productivity as "an attitude of the mind, it is a mentality of progress, of constant improvement of that which exists. It is the certainty of being able to do better today than yesterday and less well than tomorrow. It is the will to improve the present situation, no matter how good it may seem, no matter how good it may really be. It is a constant adaptation of economic and social life to changing conditions; it is the continual effort to apply new techniques to new methods; it is faith in human progress." Despite the countless definitions of productivity, one thing stands out “a comparison of outputs to inputs” (Kuykendall, 2007).

Most companies are interested in the profit they make, hence, according to Mostafa, (2003) profitability should have been the best way of measuring the performance of any kind of business but this is not the case. This is due to the fact that profits are much influenced by external factors such as shift in demand or inflation; therefore profit may rise and fall.

Management is incapable of containing these fluctuations. This makes profitability an insufficient measurement of the performance of firms.

Productivity unlike profitability reflects the effort of management in improving profits and in remaining competitive through the improvement in efficiency. Productivity is hence a preferable measure of performance in an organization.

Most productivity measurements are often limited to labour productivity. This does not imply that labour is the most important input in every production process but simply reflects the difficulty or impossibility of obtaining numerical values for other determinants of productivity (Mostafa, 2003).

Despite the fact that a complete set of methods of measuring productivity; either multi-factor or partial productivity ratios in a firm are much preferable since they present an advantage. Single factor productivity measure such as labour productivity may greatly be beneficial to businesses since firms may choose to produce labour intensive products or may want to compare its performance with that of other firms with similar modes of operation. A labour productivity measure may also be used to forecast labour requirements and capital investment needs when expansion of output is to be planned. Moreover, in collective bargaining, labour productivity may help in preparing estimates of the impact of a wage settlement on costs. Labour productivity serves as a source of competitive advantage in any kind of economy. A high level of labour productivity in the form of increase in knowledge and skills will increase output or the quality of output and if at a faster rate, benefits will be achieved through the value added to products and services (Kuykendall, 2007).

Labour productivity, according to the USAID, (2005), is determined by several determinants among which are; human capital, capital utilization, innovation, firm characteristics and

management, competition and openness to trade, and industry environment. Human capital is the most prominent determinant of labour productivity, since in it comprises the skill, knowledge and health of the individual needed to have control over the other factors of production. Health, according Grossman, has a significant effect on one's skills and knowledge, therefore, health has a significant effect on one's level of productivity through its impact on human capital.

3.15: The concept of occupational safety and health

According to the International Labour Organization (ILO, 2003), Occupational Health and Safety (OHS) refers to the outcome of adequate protection of a worker from sickness, injury and disease arising from work. It is the health and safety status of the workforce in an organization which fosters efficiency and productivity. It aims at reducing occupational accident-an occurrence arising from or in the course of work which results in either fatal or non-fatal occupational injury. According to the International Conference of Labour Statistics (1998), occupational accident could also be defined as an unexpected and unplanned occurrence, including acts of violence, arising out of or in connection with work which results in one or more workers incurring a personal injury, disease or death. Occupational injury according to the ILO, (2003), is defined as “death, any personal injury or disease resulting from an occupational accident” while Occupational disease is defined as “a disease contracted as a result of an exposure to risk factors arising from work activity”.

A fatal occupational injury occurs when an accident at work leads to the death of the victim whether immediately or not, and this varies among countries. A non-fatal occupational injury refers to an accident that does not result in the death of the person, thus this refers to any injury that the victim sustains (ILO, 1998).

3.16 Models of health production

3.16.1 The Becker Household Production of Health Model (1965)

The household production model of health is based on the notion that the evolution of one's health over a lifetime greatly depends on the genetic endowment and on the sum of every day decisions about things like nutrition, exercise and the use of medical services. These decisions either increase or decrease one's level of health stock. The underlying assumption of the household production of health is that every rational individual values good health and hence makes behavioural choices that affect his/her health status and these choices are shaped by personal, social, cultural and policy influences.

The model has four key elements which are; the preference rankings, the health production function, socioeconomic determinants of behaviour and utility maximization. The preference rankings rank the value and utility of the various combinations of health and other objectives of the individual and the individual chooses which to opt for. The health production function is strictly governed by biological factors. It is at this stage where behaviours are translated into health stocks. The determinant socio-economic component is the constraint that the individual faces. This includes income, money costs, time costs, cost of obtaining information and education. With the utility maximization component, we assume that given the constraint that the individual faces, he/ she will choose behaviours so as to obtain the combination of health and other objectives he/she values most.

3.16.2 Grossman Model of Health Production

The household production framework was what Grossman in 1972 used to model the concept of health production. Grossman defined health as a capital stock whose end product is not the health

itself but rather the services this capital yields (Urpo, 2005). Grossman considered an individual who faces a dual utility optimization period. The individual makes decisions on his/her health in the present time and that of the future by choosing consumption and investment decisions in order to attain some level of health stock.

The model combines the concepts of production and consumption. The individual produces his/her health while at the same time consuming it. The production of health is by spending time and resources in the consumption of health care. The production function curves are higher with improved levels of education, higher income groups and at low prices of medical inputs. For instance with an improved level of education it enables individuals to choose more health conscious consumption decisions and also make them a more efficient producer of health investments which in turn lowers the rate of health capital depreciation.

Like any production process the production of health is also constrained. One's level of income and the availability of one's time is the constraint in the health production.

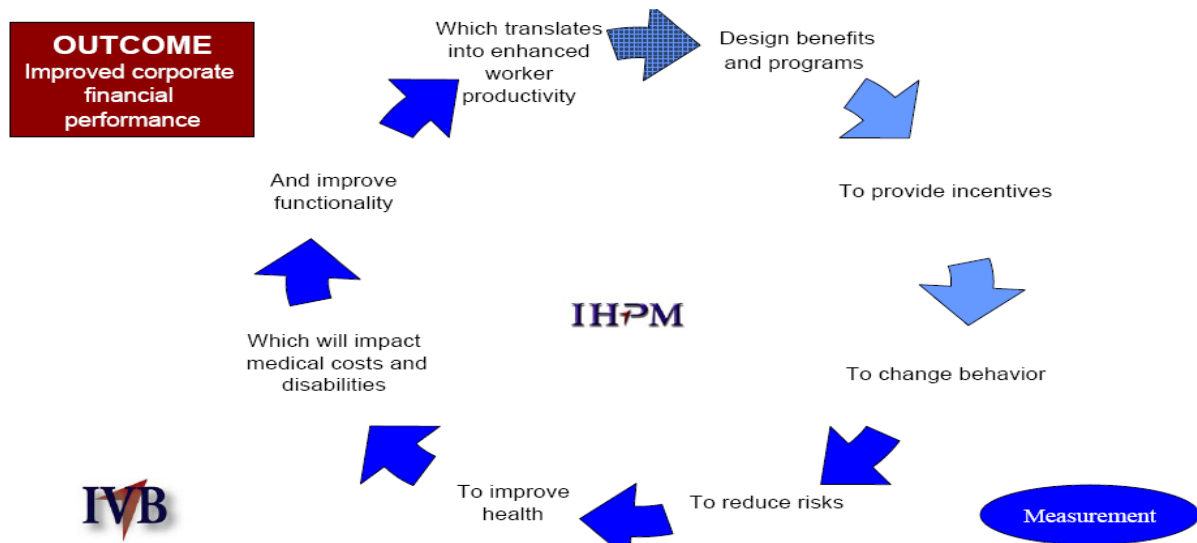
An optimal level of health is produced at the point where the marginal utility of health investment is equal to the marginal cost of health care. If the investment in health results in the reduction of the lost sick time, health is viewed as either consumption good or an investment good. If the reduction in lost sick time increases one's level of utility directly such as one feeling better for being healthy then health is regarded as consumption good. On the other hand if the reduction in lost sick time has an immediate impact on one's level of wealth by increasing the number of days available to a person to participate in market and non-market activities, then health is regarded as an investment good.

The marginal cost of holding an additional unit of health stock varies increasingly with age. Thus the marginal cost of converting health inputs into health stocks for the aged is very high since their effectiveness in converting is lower. Hence, one's health is dependent on the choice one makes regarding the kinds of investment vis-à-vis consumption decisions.

3.17 The Health and Productivity Model (HPM) of firms

The HPM is an “integration of all organizational human capital/ resources, related departments designed to accomplish a comprehensive approach geared towards reducing or eliminating health and injury risks while enhancing the portion of personal performance that is related to health” (Institute for health and productivity management, 2007). The HPM frame is an interchanged framework that links health promotion to an effective and efficient productivity in an organization. Below is the value chain of the HPM model.

Figure: 3.4 The HPM value chain



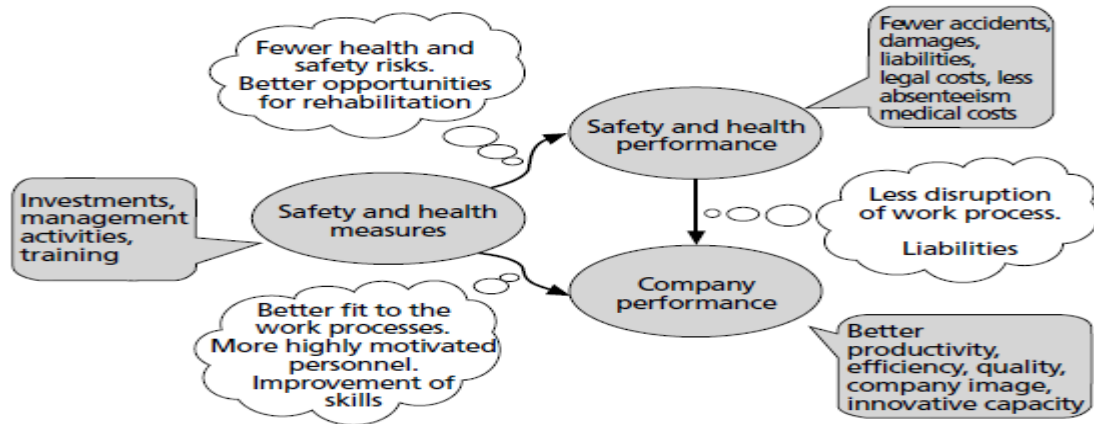
Source: Institute for health and productivity management (2007)

The ultimate aim of this model is that, when employees are healthier and safer they become more productive in order to achieve higher levels in productivity. This aim is achieved by the promotion of the wellness and benefits elements in the model. The wellness and benefits programs are beneficial to all categories of workers, whether risk loving person or a risk adverse person through enhancing employee morale and reducing turnover. A risk loving person benefits from the self-care and medical care incentives while risk adverse individuals benefit from the health promotional elements in the model.

Proponents of the HPM models believe that human capital is an investment that can be managed efficiently, rather than an expense to be avoided. Health economists believe that improvements in the health of the employee will have a substantial effect on the firm's economic viability; evidence supports the notion that health improvements stimulate economic development (O'Donnell, 2008).

3.18 The Mossink and De-Greef Model on the Effect of Safety and Health on Company Performance

This model establishes the linkages that exist between health and safety intervention on the performance abilities in firms. In 2002, Mossink and De-Greef developed a diagrammatic model to illustrate the economic effect of health and safety on organizational performance. The linkage from health and safety measures gives a qualitative overview on how a company's performance can be improved through the fewer liabilities, accidents, and the enhancement of employees' morale towards work. The model is given below:

Figure 3.5: Model on the effect of safety and health on company performance

Source: European Agency for safety and health at work (2004)

In the model, investments in health and safety measures are not isolated from other forms of organization investments, but rather go hand in hand with other human resource management. This investment in safety and health measures goes beyond the implementation of measures to control health and safety challenges. It involves the proper management of it by training staff to adhere to these measures.

The investment in safety and health does not only result in higher levels of productivity, but also increases the efficiency in the production systems in the organization. Invisible company performance measures like the image conceived by the people outside the organization is also improved, this then leads to higher levels of acceptance and the purchase of goods and services offered by the organization. This in turn leads to higher volumes in profitability.

3.19 Market for Safety and Health Provision

The level of safety and health provision in the labour market according to economist (Viscusi, 1993; Shapiro, 1999) are determined by a complex set of factors reflecting various costs and benefits faced by workers, employers and insurance markets. These factors are moderated by government regulations. Employees are rational agents who are likely to demand compensation premiums for any risk associated with their work. Safety activities and absenteeism at work by the employee is believed to be determined the kind of social insurance and compensation benefit schemes available to them. Employers are believed to face a trade-off between cost and expected benefits from the investment in safety and health measures. A safety and health measure is then provided at the point of interaction between the labour demand of firms and labour supply decisions of workers (Konstantinos et al. 2010).

In the absence of regulation, according Henderson, (1983), the optimal level of health and safety measure faced by a profit maximizing firm is at the point where their marginal preventive cost equals their marginal benefits. The marginal preventive cost rises for higher levels of health and safety measures hence has a convex shape. At the higher level of health and safety measures, the marginal benefit is lower as the employer pays smaller amount of wage as injury compensations to employees. This implies that for a constant level of profit to be achieved by firms a lower wage needs to be offered in order to offset any form of marginal addition of preventive cost. According to Konstantinos et al (2010) since firms differ in level of job hazards and technology, the optimal wage-risk pairs in maintaining the same level of profits are likely to vary across firms.

With the assumption of rationality, exhibition of perfect information and a high degree of labour market mobility on the part of an employee, a higher amount of compensation wage will be

demanded for any risk exposure. In the case of the employee, in maintaining a given level in utility will demand alternative levels of compensation wage for varying degree of risk.

In a perfect competitive (PC) labour market positive wage-risk equilibrium is expected to be achieved due to the matching of the preferences of workers and firms (Rosen, 1986; Konstantinos, et al. 2010). Regulations from government address the failure of the labour market in the provision of safety and health in an economy.

3.2 Empirical review

This sub-section brings into view empirical evidence indicating the vital role of occupational health and safety on the productivity of individuals in an organization. It firstly examines literature supporting the link of health to productivity; it is extended to cover those establishing the link between quality work environment (safe work environment) on productivity and finally empirical evidence suggesting the promotion of occupational safety and health.

The impact of health on productivity has empirically been examined in France and in Europe. Fogel, (1991) stressed that the improvement in health has a long-run dynamic effect on the productivity of the nation. He supported this notion with evidence that the health improvement which begun over 300 years ago in Europe and North-America has not fully run its course and is still benefiting the countries. In Norway, Fogel's findings reveal that the improvement and adaptations of health measures in the 18th century was coupled with a decline in the level of mortality which increased their labour force participation. Steckel's work in 2002 gives an indication of health impacts on productivity. He found out that with the correlation value between 0.82 and 0.88 between GDP indicates that health is a determinant of one's productivity. Furthermore, according to Steckel, inequalities in per-capita income among countries could be explained by the inequalities in the health status among countries. From his empirical cross-country analysis; countries with better health indicators (low morbidity rate, higher life expectancy among others) had higher per-capita income.

Improvement in nutrition which is also a way of improving health is empirically proven to substantially raise the capabilities of those already in the labour market (Fogel, 1994). Health improvement (in the form of nutrition among others) contributed to about 30 percent of the growth in per capita income in Britain since 1970. The findings of Fogel were similar to

estimates put out by the World Health Organization (1999) about the impact of health on GDP in a cross-country study. In the republic of Korea, Sohn (2000) also observed a one percent increment in labour input whenever there is an increment in the nutritional level. Arcand (2001) posits that the improvement of nutrition leads to higher economic growth rate. His findings reveal that in Sub-Saharan African countries, the improvement in nutrition would raise the economic growth rate between 0.34 percentage points and as much as 4.63 percentage points. However, Cole and Neumayer (2007) noted that the total factor productivity of a country falls as a result of malnutrition and other poor health indicators.

As a contribution to the notion of health as a determinant of productivity, Stekel, (1983), explored the relationship between height (a proxy for one's health) and productivity. He came up with the conclusion that the causal relationship between health and productivity which was unidirectional from health to per-capita income indicates that health causes productivity. Thus the per-capita income of a nation could be increased through the investment in health among the workforce especially, since they are directly involved in the production of goods and services in the economy.

According to Weil, with regards to the notion of linkage between health and productivity, he stated that 17 percent of the variation in output per worker could be explained by health differentials. In 2002, Schultz used an OLS estimation method by gathering data from three countries; Ghana, USA, and Brazil. The cross-country analysis reveals that a unit change in health stock (i.e. height) is associated with an 8-10 percent increment in wages of the individual. With these interesting findings, Knapp (2007) conducted a research about the influence of health on labour productivity. His findings reveal that with the improvement of net-nutrition in the first twenty years of an individual will cause a positive significant effect on one's productivity value.

Weil (2001) predicted economic performance using health indicators. His findings reveal that improvement in health lead to higher survival rate among workers and this translated into a 1.68 percent increment in aggregate output. He further interpreted his findings to mean that a country with a high survival rate and good health indicators especially among its workforce will make its workers to be about 70 percent more productive than unhealthy workers who live in a country of high morbidity. In 2005, Bloom and Canning improved the method employed by Weil (2001) with the aim to examine the statistical significance of Weil's findings. It was found out that the results were similar to Weil's; however, their estimate (2.8 percent) was higher than the 1.68 percent in Weil's case. Thus, their result showed a positive significant effect of the survival rate on output per labour.

The culture of organisation safety also improves the productivity of its workforce. Brenner (2004) attested to this fact by reporting in his studies that workers who work in organizations which had better safety measures were more productive than those in less safe organizations. His study also reveals that the lack of innovation and work effectiveness could be attributed to the inability of employers to fully leverage physical work environment. According to Akinyele (2007), safe environments create a conducive atmosphere which ensures the well-being of workers. They also enable them exert to their roles with all vigour and this translates into higher productivity. In the opinion of Lambert (2005), the ineffective management of the work environment constitutes an inhibiting factor to the increase in productivity. In 2010 Akinyele indicated that factors external and internal to the work environment influence productivity. This came as a result of the fact that 42.63 percent of the respondents acknowledge that poor safety conditions impeded their ability to deliver.

Occupational accidents result in a considerable economic and social burden not only on the victims, but also on employers, the state and international bodies. According to Ramessur (2009), the cost of occupational injury borne by the inhabitants of Mauritius Island is Rs. 168 million. In the United States, a direct cost of \$65 billion and an indirect cost of \$106 billion are recorded (Rauner, 2005). Also, in the United States, a cost of \$11.5 billion was recorded in the construction industries, and only five construction sectors accounted for more than half of the amount. Cost of occupational accidents mostly shifts from companies to affected persons and the government. For instance in the study of Bolden et al. (2009), an estimation of the cost of occupational accident reveals that medical costs contributed 41.48 percent of the total cost. They identified it as a cost to the government and not to the employer, since 93 percent of those who suffer from occupational injury and illness go to public hospitals which receive government subsidies.

Attempts have been made to investigate how injury and illness affect productivity and the subsequent costs to both the company and the employee for the past 50 years. Two main types of productivity costs arise from workplace incidents and illnesses – direct and indirect productivity cost. According to the US department of health and human services, the direct and indirect effects of unsafe work are obstacles to the goals and objectives in most US organizations. In addressing this short fall in productivity, they adapted injury prevention exercises across organizations and these aid employers to achieve their goals and objectives.

According to Barket et al. (1992) the obvious effect of unsafe or unhealthy work is the direct effect on productivity. He estimated that about 36,000 employees are injured annually, and 16 killed, these cause a downward sizing of firms' output levels due to the reduction in productive lives. Leigh, (1995) and Miller, (1997) found that there is a higher negative direct impact on

productivity judging by the amount in death and suffering from injuries they recorded. They noticed that between 7,000 and 11,000 productive lives are lost at the work site with about 2.5 to 11.3 million workers suffering from non-fatal injury. The indirect negative effects according to ILO, (2003) and Pettinger, (2010) are higher than the direct effects and this greatly affects an economy's productivity.

Barket et al. (1992) and Liegh (1995) in estimating the intangible effect of occupational injuries noticed that the negative side of injury far exceeded the combined effect of cancer and cardiovascular diseases. In quantifying the negative effect of safety and health in an organization, the National Safety Council in 1993 estimated the social and economic cost of pain and sufferings experienced by employers and their families. They estimated an overall liability of 116 billion USD. The research of Leigh, (1995) reveals dramatically increasing trends in the intangible effects of occupational injury. In 1985, 34.6 billion USD was recorded and this increased to 89 billion USD in 1989. From the ILO report on safe work, these intangible effects or indirect effects are about 4 times the direct effect associated with unsafe work.

These effects are currently higher than what was recorded in the past (Pettinger, 2010). According to Pettinger, approximately 200 billion USD are paid annually by employers as the direct cost of injury alone. These expenditures are largely in the form of insurance premiums and compensation wages paid to either the worker or the worker's family. Due to the underreporting of incidences at the work place, these figures could be higher than what was estimated.

According to Nomiyama (1999) and Ramessur et al. (2009) in an event of occupational injury and illness, more males fall prey than females, and such occurrences of injury and illness are found in organizations which are more labour intensive in their mode of operations. The youth are most often victims of occupational injury, since they have the tendency to take higher risks

with the aim of gaining more pay for taking such risks. The lack of knowledge, risk awareness, inexperience on their part and the lack of safety culture at the worksite also make the youth fall victim to unsafe and unhealthy work environments.

Research into the root cause of injury and illness at work is as popular as the research into the costs of occupational injury and illnesses. Changes in the organizational practices that result in the decline of full-time employment and the rise in precarious work and casual labour are some of the root causes of injury and illness which affect the health and safety of an employee. Others argue that such changes are critical in maintaining business competitiveness and increasing productivity and performance (Massey et al. 2007).

In 2011, the European commission empirically examined the extent of Occupational safety and health promotion on economic growth. Its findings suggested that health is a strong predictor of economic growth. Good health leads to economic growth by increasing savings, investment in human capital, labour market participation, foreign direct investment (FDI) and productivity. The promotion of occupational safety and health also increases the level of performance of firms because compensation cost, cost of injury and penalties will be avoided and will boost the profitability of the firm. The occupational safety and health promotion increases creativity and innovation of employees which are key elements for a firm's success. Also in support of the idea of promoting OSH at the work site in order to address the negative effects of health and safety at the work environment, ILO (2003) noticed from the analysis that safety pays in business operations. This ideal draws from the conviction that human performance is higher when people are physically and emotionally able to work and have the desire to work. This could be achieved when health and safety of individuals are considered as a priority. This hence results in higher levels of productivity.

The American Society of Safety Engineers, (2002), in establishing the link between safety and health promotion interventions and productivity reveals interesting findings from their study. The study reported that, for any US\$1 invested in safety intervention, the return was US\$8. With other similar examples, the summary of the findings was that there is a positive effect of safety and health promotion activities on the productivity of individuals, the organization and the economy as a whole. Barefoot Economics (2005) also reveals similar findings by signalling a positive relationship in the promotion of quality work environment on the delivery capacity of workers in an organization.

Awareness of safety programs is beneficial to business operations, since the implementation of safety interventions significantly reduces direct health care cost and absenteeism (Bunn et al. 2001). Safety interventions and awareness programs for instance reduce stress in individuals. This according to Cooper et al. (1996) did not only reduce the cost of employees' health but also positively maintained and improved organizational productivity. Court, (2003) found out that with the promotion of health interventions which significantly lead to the prevention of injury ensured higher volumes in productivity in the organizations under study.

In examining what will challenge the early implementation of safe culture at the work place by the employer, Goetzel, (1999) reveals that in the United Kingdom, the fear of losing corporate credibility and the moral norm of not harming someone are the key drivers that goad managers to adhere to safety interventions. The findings of the ILO, (2008) in the USA about the inspiring element by employers in implementing safety measures was in contrast to what Goetzel identified in the UK. The cost of ill health and injury were what the ILO identified as having motivated USA employers to adopt safety culture. Smallman and John, (2001) found out that competitive advantage in the labour market and world class business performance are the

motivational factors in the study area for the adoption of safety interventions in organizational functions.

According to Dorman (2000), for an effective implementation of health and safety interventions in an organization, the cost of ill health and injury needs to be economic (i.e. quantifying the cost of damages to goods and services), internalized, visible and variable (i.e. whether cost changes with changes in incidences of injury and illness). These will prompt the early implementation of OSH measures.

3.3 Summary

From the theoretical and empirical review presented above, the health and safety status is identified as a determinant of labour productivity. The chapter outlined various models and concepts linking health and safety to the productivity of the individual. It showed positive direct effects on productivity. Empirically, the impacts of health and safety on productivity have been established independently. The ideal of explaining the variation in output per worker or aggregate output using health indicators and the establishment of correlation between productivity and health indicators indicates the impacts of health on productivity. In the case of safety, the link to productivity is observed through the reduction in injury, death, compensation costs and the suitability of the environment for human activities. Marginal estimates of health and safety on the delivery abilities of humans will be very welcoming. Unfortunately, this is lacking in empirical reviews. This is what this study seeks to establish.

CHAPTER FOUR

THEORETICAL FRAMEWORK AND METHODOLOGY

4.0 Introduction

This chapter firstly provides a theoretical framework leading to how the model to be estimated will be expressed. This is then followed by a discussion on estimation techniques and diagnostic tests explaining why these are relevant to the study and how they will accomplish stated objectives. Discussions on the population, sample area, data collection procedures and the rationale for these methods will be made in the study.

4.1 Theoretical framework

From the literature review, it is noticed that productivity can be increased through effective management of health and safety in an organisation. Therefore, the underlying theoretical framework for this study is the endogenous growth model developed (i.e. learning by doing) by Romer, (1996).

The central idea of this model is that, as individuals produce goods, they further think of ways of improving their delivery abilities with the aim to increase the production process, without necessarily incorporating any form of innovations in the production process. Thus, an accumulation of ideas or knowledge occurs not because of deliberate effort but as a side effect of conventional economic activity. This conventional economic activity can be said to be the effective management of health and safety in an organisation. This is because health and safety is not new, hence cannot be said to be an innovation to the production process of an organisation. It however increases the delivery abilities of employees.

In this model, the rate of knowledge accumulation does not depend on the fraction of the economic resources invested in research and development. It rather depends on how many ideas are generated by conventional economic activity.

The model starts with the Cobb-Douglas production function with the imposition of constant returns to scale. $Y(t) = K(t)^\alpha [A(t)L(t)]^{1-\alpha} \dots \dots (1)$

Where $Y(t)$ refers to output, $K(t)$ refers to capital, $A(t)$ refers to ideal/knowledge, $L(t)$ refers to labour.

Assumptions under this model include:

$$A(t) = BK(t)^\emptyset \dots \dots (2) ,$$

This is to say that knowledge accumulation is an increasing function of how capital increases with the assumption where that there is no addition to labour. $B > 0$ is a constant parameter and \emptyset is the share of capital in the production of knowledge.

$$K\dot{(t)} = sY(t) \dots (3)$$

Equation three is the dynamics of capital with the assumption of no depreciation to capital.

In analysing the properties of the economy, equation two is substitute in one.

$$\text{This yields } Y(t) = K(t)^\alpha B^{1-\alpha} K(t)^{\emptyset(1-\alpha)} L(t)^{1-\alpha} \dots \dots (4)$$

$$\text{The dynamics of K is given as } K\dot{(t)} = sB^{1-\alpha} K(t)^\alpha K(t)^{\emptyset(1-\alpha)} L(t)^{1-\alpha} \dots \dots (5)$$

A key determinant of the dynamics of K is how $\alpha + \emptyset(1 - \alpha) = 1 \dots (6)$

Since it is assumed that labour is constant and B also constant, hence the assumption of constant returns is applicable to only K. Hence, the key determinant of K is $\emptyset = 1$. This is obtained from the simplification of equation 6.

Now if $\emptyset = 1$ and there is no change in the labour force, it implies that equation (5) becomes

$$K\dot{(t)} = sB^{1-\alpha}K(t)L(t)^{1-\alpha} \dots\dots(7)$$

Since B and L are constant we let $b = B^{1-\alpha}L(t)^{1-\alpha}$.

$$\text{Hence } K\dot{(t)} = sbK(t) \dots\dots(8)$$

From equation 8, K grows steadily at the rate sb . That is from equation 8 dividing through K(t)

gives: $\frac{K\dot{(t)}}{K(t)} = sb$, which is the growth rate of capital.

Also with the assumption of $\emptyset = 1$ and no change in labour force, it implies that equation (4)

$$\text{becomes } Y(t) = B^{1-\alpha}K(t)L(t)^{1-\alpha} \dots (9).$$

Substituting $b = B^{1-\alpha}L(t)^{1-\alpha}$ into equation 9 gives us:

$$Y(t) = bK(t) \dots \dots (10).$$

Thus, output is proportional to capital and since b is a constant, it further implies that the growth of output is the growth of capital which also depends on the savings rate which is endogenously determined. This is because the contribution of capital is larger than its conventional contribution; increased capital did not only raise output through its direct contribution to productivity ($K(t)^\alpha$ in equation 4) but also indirectly contributed to the development of new ideas and thereby making other capital ($K(t)^{\emptyset(1-\alpha)}$ in equation 4) more productive.

Safety of the organization is regarded as savings since a high level of safety implies that capital is safe hence reduces any form of depreciation in capital which has the influence of reducing output (Finish institute of occupational health, 2012). Also the health of the individual will ensure growth since it helps to maintain that given level of labour which is exogenously determined in the growth of K by eliminating any form of reduction in labour force which may be caused by poor health.

Therefore equation nine can be reinstated as $Y = f(\text{safety}, \text{health}) \dots \dots (11)$, since $B^{1-\alpha}$ is a constant parameter. Safety helps to reduce output by ensuring the reduction of capital depreciation. Health helps to maintain the exogenous amount of labour.

4.2 Specification of the empirical model

From the theoretical framework, it was reinstated that effective management of health and safety can be regarded as conventional economic activity. Also from the literature review, the level of risk as the potential of affecting one's performance and that male are much dominant in risky jobs than females. Therefore using gender and levels of risk as controls in aim of reducing estimation bias associated with few predictors, the empirical model of the study is given as:

$$Y = \beta_0 + \beta_1 \text{gender} + \beta_2 \text{littlerisk} + \beta_3 \text{largerisk} + \beta_4 \text{verylargerisk} + \beta_5 \text{extremelylargerisk} + \beta_6 \text{gender} * \text{nature of risk} + \beta_7 \text{health} + \beta_8 \text{safety} + \varepsilon \dots (12)$$

Where *gender* is a dummy variable for male or female.

littlerisk, *largerisk*, *verylargerisk*, *extremelylargerisk* are proxies for risks which are dummy in nature.

*gender * nature of risk* is a proxy for the interaction effect between gender and level of risk. This is as a result of males being more associated with risky jobs as observed from literature.

health and *safety* refers to the health of the workforce and the safety of the organisation respectively.

The β_i 's are the coefficients of the regressors in the linear model, this gives the marginal effect of the regressors on the dependent variable. ϵ_i refers to the error component of the regression model. This accounts for the random effects in the variables of the model. It also accounts for the exclusion of important variables which could have a significant impact in the estimation of the model.

4.3: A priori expectations of independent variables

Health:

Health is expected to have a positive relation with the dependent variable. Empirical findings support this notion. For instance Weil (2001) found out that improvement in health leads to higher survival rate among workers and this is translated into increments in aggregate output.

Safety:

Empirically, high level of safety creates a conducive working environment where incidences of injury, fatality and death are eliminated or reduced to the barest minimum and this stimulates workers' performance (Akinyele (2007) and Lambert (2005)). In line with this, it is expected that safety will have a positive relation with the dependent variable.

Risk:

From the empirically findings of Barket et al. (1992), Miller, (1997) and Leigh, (1995), it was established that risk had an inverse relationship with productivity. This is because as the level of risk rises, the working environment becomes less conducive and therefore affects the vigor that workers exhibit towards work. It is therefore expected that the risk will be negatively related to productivity.

Gender:

The sign of gender is expected to be ambiguous (i.e. $\beta_1 \leq 0, \geq 0$), since it was added to the empirical estimation equation as a dummy variable to control estimation bias. A slope of $\beta_1 < 0$ will indicate that males are more productive than females and vice versa, since males were coded as zero and females one.

Interaction effect:

The interaction effect is expected to be negatively related to productivity i.e. $\beta_6 < 0$, since it is empirically established by Nomiyama (1999) and Ramessur et al. (2009) that males are dominant in risky jobs. A negative sign will hence support their notion, but, a positive sign will indicate that females could be also associated with risky jobs like their male counterparts.

4.4 Diagnostic tests

As a rule of thumb in regression analysis, a diagnostic test is needed to know the statistical precision of the data set. A test for normality, multicollinearity, heteroscedasticity and model fit tests shall be carried out.

One of the basic classical regression assumptions is that there should be normality in the model. Although most researchers assume the existence of normality without empirical testing, it does not undermine the importance of this test in research (Park, 2008). The violation of this assumption makes the interpretation and inferences from the study unreliable and invalid. Normality can be checked by either a graphical method or numerical method or both. These methods are either descriptive or theory driven. The graphical methods visualised the distribution of a random variable and compare the distribution to a theoretical one using plots while numerical methods uses descriptive statistics and statistical tests to examine normality. Although the numerical method offers an objective criterion to determine normality of variables the graphical methods offers an appealing visualization. Hence, the graphical method shall be adopted to examine the normality in the residual of the regression model.

Multicollinearity is a common problem in most research. It refers to the situation where some of the explanatory variables are not independent but are correlated with each other. Multicollinearity is a problem in regression analysis, since it becomes impossible to assign a change in a dependent variable precisely to a particular explanatory variable. Moreover, in the presence of multicollinearity, the precision power of the independent variable is reduced (Salvatore & Reagle, 2002). The addition of more data sets, the utilization of prior information, transformation of the data set or the dropping of one of the highly correlated explanatory variables are the means of avoiding multicollinearity in regression analysis. Multicollinearity can be checked using either the VIF (Variance Inflation Factor), the DW (Durbin Watson) statistics or by the Correlation Matrix test. A correlation coefficient of 0.8 gives an indication of multicollinearity, but a value of 0.95 and beyond implies that there is serious multicollinearity in the data set. This approach for checking multicollinearity conveys little information on the

presence of multicollinearity because, it may conceal problems like curve linearity, outliers or clustering of data points. Hence the problem of multicollinearity is better diagnosed by the VIF. A VIF value of 10 indicates the presence of multicollinearity in the data set (Salvatore & Reagle, 2002).

Heteroscedasticity occurs if the OLS assumption of equal variance of the error term is violated. This is a major setback in most cross-sectional data sets since they appear not to have equal variance. In the presence of heteroscedasticity, the OLS estimators, although unbiased become inefficient hence they have weak statistical precision power. The standard errors of the coefficient are both biased and inconsistent. This increases the probability of accepting a false null hypothesis. To diagnose the presence or absence of heteroscedasticity, one can either perform the Breusch Pagan/ Cook – Weisberg test or the plot of the residual against the fitted values of the dependent variable. In the Breusch Pagan/ Cook – Weisberg test, a null hypothesis of equal variance is set. The test statistics is the chi-square test. This follows a chi-square distribution with $k - 1$ degree of freedom at a chosen alpha value. The k refers to the total number of regressors in the model. The null hypothesis is rejected if the calculated chi-square does not fall in the critical region. In the case of the plot of the residual against the fitted values of the dependent variable, the lack of pattern and a uniform distribution of the observations suggest the absence of heteroscedasticity.

According to Wooldridge (2004), the goodness of fit is not usually as important as the statistical and economic significance of the explanatory variables. A model fit refers to the variation of the dependent variable explained in the model by the inclusion of the independent variables. Thus in a well-fitting model, the predicted values will be closed to the observed values. There are 3 statistics used to evaluate model fit in regression analysis. These are the R-squared, the overall F-

test and the Root Mean Square Error (RMSE). The best measure of model fit according to Grace-Martin, (2012), is dependent on the objectives set by the researcher.

4.5 Estimation techniques

With the first objective to “determine the relationship between labour productivity and the health and safety status of employees” a univariate multiple regression model will be used to achieve this objective.

A univariate multiple regression model has several independent variables (predictors) regressed on a dependent variable. In matrix notation, the generalised univariate regression model takes the form:

$$\begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{pmatrix} = \begin{pmatrix} 1 & x_{11} & \dots & x_{1k} \\ \vdots & \vdots & \dots & \vdots \\ 1 & x_{n1} & \dots & x_{nk} \end{pmatrix} \begin{pmatrix} \beta_0 \\ \vdots \\ \beta_k \end{pmatrix} + \begin{pmatrix} \epsilon_1 \\ \epsilon_2 \\ \vdots \\ \epsilon_n \end{pmatrix} \dots \dots (13)$$

Where k refers to the number of regressors in the model and n the sample size.

With *labour productivity* as the dependent variable and the independent variables being: *gender, nature of risk, the interaction effect of gender and risk, the health and safety of the employees*; the univariate model to be estimated is give as:

$$\begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{pmatrix} = \begin{pmatrix} 1 & x_{11} & \dots & x_{18} \\ \vdots & \vdots & \dots & \vdots \\ 1 & x_{n1} & \dots & x_{n8} \end{pmatrix} \begin{pmatrix} \beta_0 \\ \vdots \\ \beta_8 \end{pmatrix} + \begin{pmatrix} \epsilon_1 \\ \epsilon_2 \\ \vdots \\ \epsilon_n \end{pmatrix} \dots \dots (13a)$$

The objective is fulfilled by the indicated sign and magnitudes of the least square estimate of the coefficient of β_7 and β_8 in the univariate multiple regression model. This will then answer the effect of safety and health on labour productivity.

In addressing the second objective, that is to “determine the extent to which health and safety affect labour performance at the work place”, the multivariate multiple regression model will be employed in this study. This is due to the reason that the model performs several univariate multiple regression analyses at a time and it is hence better to compare estimates of separate regressions most especially when the number of regressors is the same (Johnson and Wichern, 2007).

In matrix notation the generalised multivariate multiple models take the form:

$$\begin{pmatrix} y_{11} & y_{12} & \dots & y_{1p} \\ \vdots & \vdots & \dots & \vdots \\ y_{n1} & y_{n2} & \dots & y_{np} \end{pmatrix} = \begin{pmatrix} 1 & x_{11} & \dots & x_{1q} \\ \vdots & \vdots & \dots & \vdots \\ 1 & x_{n1} & \dots & x_{nq} \end{pmatrix} \begin{pmatrix} \beta_{01} & \beta_{02} & \dots & \beta_{0p} \\ \vdots & \vdots & \dots & \vdots \\ \beta_{q1} & \beta_{q2} & \dots & \beta_{qp} \end{pmatrix} + \begin{pmatrix} \epsilon_{11} & \epsilon_{12} & \dots & \epsilon_{1p} \\ \vdots & \vdots & \dots & \vdots \\ \epsilon_{n1} & \epsilon_{n2} & \dots & \epsilon_{np} \end{pmatrix} \dots \dots \dots (14)$$

Assuming labour performance can be assessed by attendance, quality of job performance, volume of work done, one’s concentration level at work and the effort put into work. These proxies represent the several y ’s and the regressors in equation (12) represent the set of independent variables. The multivariate model to be estimated hence takes the form for a sample size of n .

$$\begin{pmatrix} y_{11} & y_{12} & \dots & y_{15} \\ \vdots & \vdots & \dots & \vdots \\ y_{n1} & y_{n2} & \dots & y_{n5} \end{pmatrix} = \begin{pmatrix} 1 & x_{11} & \dots & x_{18} \\ \vdots & \vdots & \dots & \vdots \\ 1 & x_{n1} & \dots & x_{n8} \end{pmatrix} \begin{pmatrix} \beta_{01} & \beta_{02} & \dots & \beta_{05} \\ \vdots & \vdots & \dots & \vdots \\ \beta_{81} & \beta_{82} & \dots & \beta_{85} \end{pmatrix} + \begin{pmatrix} \epsilon_{11} & \epsilon_{12} & \dots & \epsilon_{15} \\ \vdots & \vdots & \dots & \vdots \\ \epsilon_{n1} & \epsilon_{n2} & \dots & \epsilon_{n5} \end{pmatrix} \dots \dots \dots (14a)$$

Where $y_{.1}$ represents attendance at work, $y_{.2}$ the quality of job performance, $y_{.3}$ volume of work done, $y_{.4}$ one’s concentration level and $y_{.5}$ the effort level. x_j represents the regressors as stated

in equation (12). Where $j = 1 = \text{gender}, j = 2 = \text{littlerisk}, j = 3 = \text{largerisk} \dots j = 8 = \text{safety}$

The model for y_{1i} becomes

$$\begin{pmatrix} y_{11} \\ \vdots \\ y_{n1} \end{pmatrix} = \begin{pmatrix} 1 & x_{11} & \dots & x_{18} \\ \vdots & \vdots & \dots & \vdots \\ 1 & x_{n1} & \dots & x_{n8} \end{pmatrix} \begin{pmatrix} \beta_{01} \\ \vdots \\ \beta_{81} \end{pmatrix} + \begin{pmatrix} \epsilon_{11} \\ \vdots \\ \epsilon_{n1} \end{pmatrix} \dots \dots (14b)$$

which is just like univariate multiple regression model of the effect of health and safety on employee's attendance at work. A similar model could be written for the other measures of labour performance.

The least square estimate of the β_i 's for $i = 7, 8$ in equation (14b) indicates the extent of health and safety on the various measures of performance indicators. This addresses the second objective of the study.

To achieve the last research objective "to determine the significance of the effect of health and safety policies on labour productivity across firms", the F-testing procedure will be carried out. A null hypothesis "the effect of health and safety on productivity does not differ across firms" will be set. This will be against an alternative hypothesis that "the effect of health and safety on productivity differs across firms". A decision regarding the acceptance or rejection of the null hypothesis is dependent on whether the probability value is greater or less than the alpha value.

4.6 Data collection procedure

Data collection refers to the stage where all necessary and useful data are collected for the purpose of achieving the stated objectives in a research. Two kinds of data are used in this study: primary data which involve; interviewing and administrating of questionnaires and secondary data from the Ghana Employers' Association (GEA). An interview is a conversation carried out

with a definite aim of obtaining certain information which is reliable and valid. An interview aims at solving problems of misunderstanding of certain questions in the questionnaires and also to better understand all issues concerning the study (Mensah, 2011).

The administration of questionnaires was self-administrated. Close-ended questions were developed where each question offered a set of alternatives from which the respondent chooses the option that closely represents his/her view. Moreover, most closed-ended questions are more efficient, reliable and they produce more consistent results for interpretation. They allow for the comparison of responses from respondents and finally produce frequency in responses. This is unlike open-ended questions (Mensah, 2011).

Secondary data were obtained from the GEA for the purpose of randomly selecting six industrial sectors. The mode of business operations differs across firms and hence there is likely to be variability in health and safety challenges faced by employees. This variability is expected to have varied impact on labour productivity. Other secondary data such as textbooks and journals were obtained from libraries and internet sources.

4.7 Survey instruments

The survey instruments consisted of three sections. The first section of the survey document is the Short Form (SF-12); it included instructions for filling in and submitting the survey regarding one's health status but it is edited to suit the case of the area of study. The second part of the survey document borders on safety and finally, the last section deals with the productivity of the employee. All survey items were limited to single-answer possibilities only and are close ended in nature.

The survey employed the stratified random sampling technique. This method was chosen over the other kinds of sampling techniques (i.e. simple random sampling, systematic random sampling and cluster random sampling). The reason is that one of the underlying objectives of the study is to determine whether the effect of health and safety on labour productivity really differs across sectors of industry. Hence, the use of any other sampling technique will not let this objective to be achieved since it will fail to categorise employees into groups.

For the purpose of inferential statistics and also due to time and resources constraint, a target sample size of 420 employees will be surveyed. 70 employees per the six sectors of firms were randomly selected from firms listed in the GEA report.

4.8 Sampling design

The survey is conducted in the Greater Region of Ghana since the region has a large percentage of companies listed in the Ghana Employers' Association (GEA). Also, the region is selected because it contains the largest city in the country where most head offices of organisations are and the accessibility to the workforce is much easier. Another interesting feature of this regional part of Ghana is that it contains firms in all the categorical sorting of firms by the GEA.

The main sampling units under this study are the employees in the firms listed in the GEA. Using the proportional allocation of sample size i.e. $n_i = n * \frac{N_i}{N}$ the required number of firms was selected from the six categories which were randomly selected due to the convenience of administration. n_i refers to the number of firms to be selected from stratum i , N_i refers to the size of the i 'th stratum, n refers to the total sample size of target firms and N is the total number of firms in the area of study as listed in the GEA report. A large sample size implies that a particular stratum is large, has more variability in the stratum and the sampling from such a

stratum will be cheaper since firms in such categories are common. 70 questionnaires were administered to workers in each of the strata this is to obtain unbiased estimates in the population parameters. This implies that a total of 420 respondents is the target sample size from which the analysis of the study will be carried out.

The administration of questionnaires was carried out by the researcher. Pre-tests are essential and as such were carried out since it helped the researcher to determine the average time needed to administer a questionnaire, assess the ability of respondents to understand the questions posed and further make adjustments to the subjective questions.

4.9 Discussion on the population

The target population of study is firms in greater Accra region of Ghana. The Greater Accra region is the smallest of the 10 administrative regions in terms of land area in Ghana (i.e. 3,245 square kilometres representing 1.4 percent of the land size of Ghana) and specifically it is the capital of the nation and also the hub of headquarters of most firms. It lies in the south east part of the country along the gulf of guinea and has costal savannah, a little forest area inland towards the eastern in the Ga District and a mile of beautiful coastline especially in the rural parts of the region.

It is the most densely populated part of the country, and it is segmented into six districts namely; Accra Metro, Ga West, Ga East, Tema, Dangme East and Dangme West. It has a population of about 3 million (about 15.4 percent of the overall population) and it is the second most populated region after the Ashanti region (GHS, 2007).

The economically active population in the region is estimated to be 823,327. However, the daily influx of people from neighbouring regions makes the figure higher than the estimate (AMA,

2006). Accra is the major centre of several economic activities such as manufacturing, marketing, finance, insurance, transport and tourism. It has about 350 major established industries, 9 commercial banks (with 81 branches), 4 development banks (with 19 branches), 4 merchant banks (with 7 branches), 3 Discount Houses, 1 Home Finance mortgage bank, building societies, a stock exchange, 218 foreign exchange bureaux, 9 finance houses, 9 insurance companies, 12 insurance brokerage firms, 2 savings and loans companies and a host of real estate developers (AMA, 2006).

Economic activities in this part of the country can also be sorted into 3 sectors, namely; the primary, secondary and the tertiary sectors. Farming, fishing, mining and quarrying constitute the primary sector, while manufacturing, electricity, gas, water and construction form the secondary sector. The tertiary sector consists of wholesale trade, retail trade, hotel, restaurant, transport, storage, communication, financial intermediation, real estate service, public administration, education, health and other socio-economic activities.

This part of the region is dominant in the country in terms of employment, employing about 531,670 people in the service sector; about 22.34 percent (i.e. 183,934 people) of the labour force in the secondary sector. It also has about 114,198 of unemployed labour (GSS, 2007), representing an unemployment rate of 12.2 percent. The primary sector is the least employing sector; employing about 91,556. As an area with coastal settlement, the predominant primary economic activity is fishing (which is 77.8 percent) and in some cases urban agriculture (22.2 percent) is seen in this area (Accra Metropolitan Assembly, 2006).

4.10 Discussion of the sample

A target sample size of 420 employees is to be randomly selected from the Greater Accra Region. The Ghana Employers Association report in 2009 has nineteen categories of firms but only six were randomly selected for this study due to administrative convenience and for inferential purposes. In each of the categories we have firms in the greater Accra region. Firms were randomly selected from the 6 strata, and 70 employees were randomly selected from the various strata in order to assess the impact of health and safety on the level of productivity of employees. Table 4.1 shows the strata of firms and strata size in the greater Accra region as listed by the GEA.

Table 4.1 categories of firms in Accra

Strata	Total number of firms
AGRICULTURAL/FISHING INTERESTS	14
AIRLINES AND INLAND TRANSPORT INTERESTS	5
BANKING INTERESTS	27
BUILDING AND CIVIL ENGINEERING INTERESTS	16
COMMERCIAL INTERESTS	84
EDUCATIONAL SECTOR INTERESTS	7
HEALTH SECTOR INTERESTS	8
HOTEL, CATERING AND TOURISM INTERESTS	11
INFORMATION COMMUNICATION AND TECHNOLOGY	13
INSURANCE INTERESTS	16
MANUFACTURING INTERESTS	95
MINING INTERESTS	5
PHARMACEUTICALS INTERESTS	13
PETROLEUM AND POWER INTERESTS	9
PRIVATE PROTECTIVE SECURITY INTERESTS	3
PRESS AND PUBLISHING INTERESTS	13
SHIPPING/ PORT INTERESTS	19
TIMBER INTERESTS	3
UTILITY INTERESTS	5
TOTAL	347

Source: GEA (2009)

Not all firms in the randomly selected categories are used; the stratified proportional allocation of sample size is employed to determine a stratum in the various strata. In all, 60 firms are studied. A minimum of 3 and a maximum of 31 firms are given by the proportional allocation

formula. Table 4.2 indicates the number of firms selected from the categories of firms. Administration of questionnaires follows after the determination of the stratum size.

Table 4.2 categories and number of firms to be studied

Strata	Total number of firms selected from the 6 categories (i.e. 182)	Approximation of firms selected
BANKING INTERESTS	8.9011	9
BUILDING AND CIVIL ENGINEERING INTERESTS	5.2747	5
INSURANCE INTERESTS	5.2747	5
MANUFACTURING INTERESTS	31.3187	31
PETROLEUM AND POWER INTERESTS	2.9670	3
SHIPPING/ PORT INTERESTS	6.2637	6

Source: Author's survey, 2013

CHAPTER FIVE

PRESENTATION AND DISCUSSION OF RESULTS

5.0 Introduction

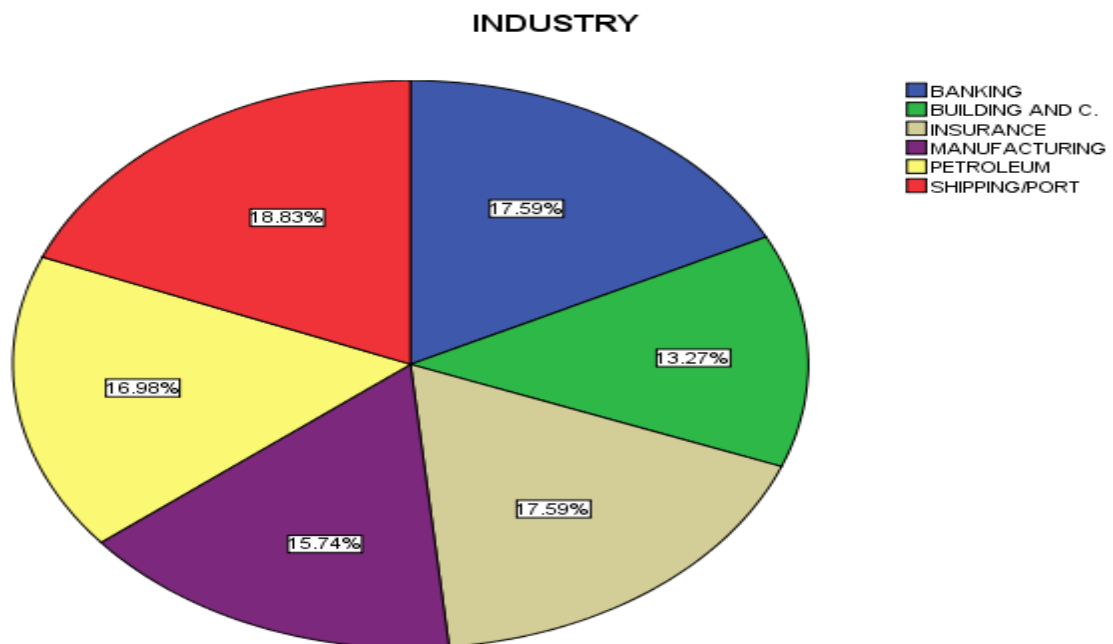
This section covers the presentation and discussion of results in addressing the research objectives. Analysis will be presented in three forms: descriptive statistics, econometric estimations and inferential statistics.

5.1 Discussion on the Response Rate

Administration and collection of questionnaires took a period of six weeks. A total of 420 questionnaires were administered across the six sectors of firms listed in the previous chapter: 70 questionnaires per sector of industry. 324 questionnaires were used in the analysis, 96 questionnaires were dropped due to either discrepancy in the answers or non-responses. Thus, a response rate of 77.14 percent was recorded in this study. The shipping/port sector recorded the highest response rate with a value of 18.83 percent of the 324 valid responses. This came as a result of the few questionnaires dropped under this sector; a non-response of 7 and discrepancy in answering of 2. The high response rate in the Shipping sector can be attributed to the high level of importance of the study to their work activities. The least response rate was in the building and construction sector with a value of 13.27 percent. This is attributed to the high level of questionnaires dropped in the analyses; a non-response of 22 and discrepancy in answering of 5. Intuitively, the low response rate in the building/construction sector is attributed to the low level of education of workers in this sector. The workers hence did not see the relevance of this

study in their working activities. Also, some workers in this sector saw the study as an interference with their earnings since the wages of most workers in this sector are determined by the number of hours worked. They would rather maximize their earnings than help in the filling of the questionnaires. Males were dominant in the study with a response rate of 62.3 percent and that of the females was 37.7 percent. The share of males in the survey reveals the dominance of males in the formal sectors of employment in the Ghanaian economy as revealed by Alfers (2009). According to him, with the 8.5 percent of the Ghanaian labour force in the formal sector of the economy, males form 62.35 percent whilst females form 37.65 percent. The reverse is the case in the informal sectors, he noted. Figure 5.1 indicates the share of response by sector of firms study in the survey and table 5.1 indicates the level of non-response and discrepancy in answering by sectors of industry.

Figure 5.1: Percentage share of response by sector of industries



Source: Author's survey, 2013

Table 5.1: Questionnaires dropped due to non-response and discrepancy by sector of industry

Sector	Non-response	Discrepancy
Shipping/ Port	7	2
Building/ Construction	22	5
Banking	9	4
Insurance	6	7
Manufacturing	11	8
Petroleum	13	2
Total	68	28

Source: Author's survey, 2013

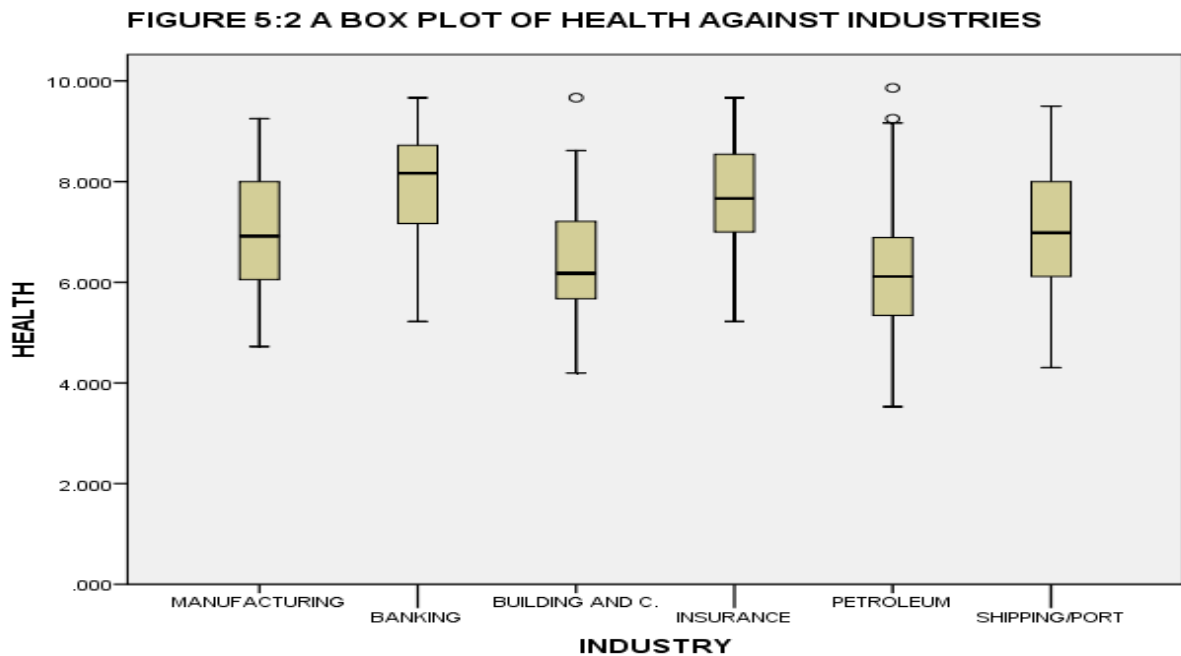
5.2 Health status of employees

Physical pain, emotional stability and one's relation with others were used as indicators to capture the three dimensions of health as can be observed in the definition of health by the WHO. Responses were scaled on an interval of ten; the closer the mark to ten indicates how healthier the person is. It was therefore evident from the study that employees' health was good since the average amount of health stock was 70.8 per cent of what an ideal employee health stock should be. The remaining 29.2 per cent of health stock which were lost can either be due to

the lack of promotion and implementation of health measures or by the law of diminishing returns on health stock as noted in the review of the literature. Employees' health stocks were positively skewed by a magnitude of 0.014. This skewness indicates that most employees had health stock slightly above the mean. This is due to the fact that most workers had no or little physical and emotional health challenges. Workers' health stock had a lower bound value of 3.53 and upper bound value of 9.86. This bounded value indicates the range of the health stock of employees recorded in the survey falls. The Banking and Insurance sectors which are less labour intensive compared to the other sectors like the shipping/port, petroleum, building/construction, manufacturing sectors, had better health measures. It was evident that these sectors had very little health challenges like physical pain, emotional instability due to measures they have adopted to improve the well-being of their workforce. For instance, these sectors have medical care incentives and high levels of remuneration which offsets the constraints to demand of health care. Hence employees in these sectors had a lot of physical and mental energy to perform their duties and as such were either not limited at all or hardly limited during work and non-work activities. However, the variation in these incentives and remunerations resulted in different amounts of mean health stock in these two sectors. The mean amount of health stock in the banking sector was 7.83 and that for the insurance sector was 7.66. Health status by gender was fairly equal in the banking industry but females had higher level of health stock than their male counterparts in the insurance sector. There were no apparent reasons for this observation. However, this observation could be attributed to the fact that females capitalized more on this medical incentive to maximize their health stock in the insurance sector. In the case of the banking sector, the opportunity cost of males losing their job due to ill health can be said to be

higher than females and as such capitalized on the medical incentives provided in order to have good health to undergo their daily working activities.

The other four sectors surveyed had mean levels below the general mean health stock. It was observed that activities in these sectors were either labour intensive or risky in nature and this has the propensity to increase the depreciation rate of health stock in such individuals. It was also observed that some of these sectors like the manufacturing, petroleum and shipping adopted health promotion measures which are however not adequate. This is because not all workers were covered by these health promotion incentives. Most of such workers were casual. This therefore acted as a constraint to receiving medical care and as such lowered the mean health stocks in these sectors. Also, the building/construction sectors are mostly owned by private individuals who see the provision of health incentives as cost hence fails to adopt. These therefore resulted in the low level of health stock in these sectors. In descending order of the mean amount of health stock, the mean health stock of the manufacturing sector was higher than that of the shipping/port sector. The petroleum sector's health stock was also higher than the building and construction sector's. Figure 5.2 displays the mean amount of health stock by sectors. Observations from the distribution of health stock across sectors could partially be explained by the findings of Waehrer et al. (2007) that, the riskier the nature of one's job, the poorer one's health status.



Source: Source: Author's survey, 2013

It is also evident from figure 5.2 that, there were however, fewer people in the building/construction and petroleum sectors with health stock above the upper bound level of health stock in the banking and insurances sectors. This is displayed by the positive outliers found in the building/construction and petroleum sectors in the above figure. This observation came from the fact that, few workers under this sector may have resorted to other forms of health care such as traditional health care and this could have influenced their health.

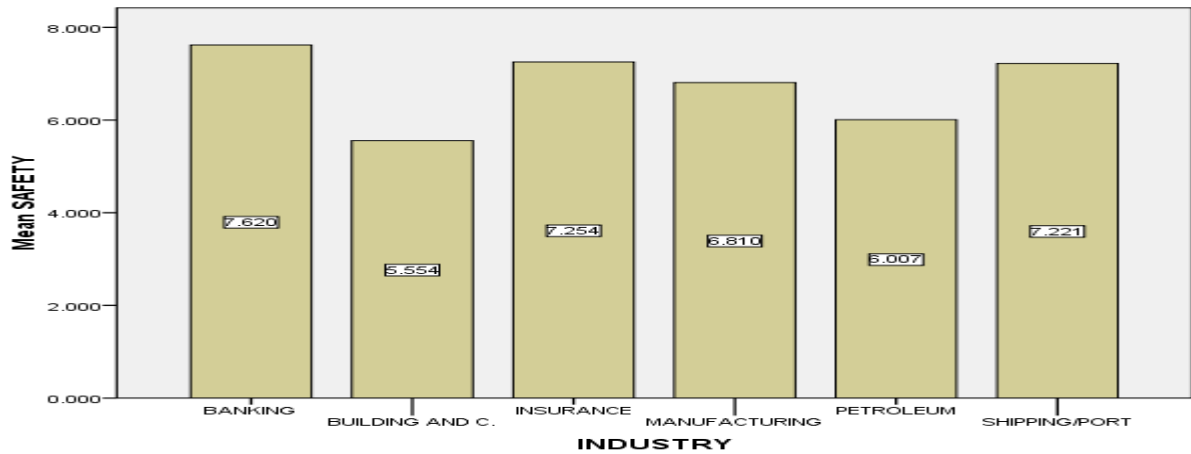
5.3 Safety

In assessing the level of safety and how adequate it is at the workplace, employees were given the opportunity to answer questions regarding the provision and adequacy of safety procedures in their organizations. Twelve (12) different safety questions were asked, this was to give a wide range ways of assessing safety at work. Safety was also assessed on a scale of 1 to 10. Where 10 refers to the situation where there is a better understanding, implementation, adhering and communication of safety measures at the place of work. The point one (1) scale of the measurement refers to the extremely opposite case.

It was evident from the results that the mean level of safety was 6.81. This indicates that the mean level of understanding, implementation, adhering and communication of safety measures at the places of work surveyed was 68.1 percent. This implies that current level of safety is averagely good however, 32 percent more of safe work condition measures needs to be addressed. Large proportions of employees believe that current levels of safety in their working environment were satisfactory due to the refresher safety trainings sections they do received. This is evident by the distribution of safe conditions indicated by the skewness statistics of 0.047. The study reveals that females generally were safer than males at the place of work. This observation came from the fact that although with the same level of safe conditions in the organizations, due to the high risk aversion of females, many females applied safety instructions during working activities. This resulted in 69.2 percent female level of safety while males had 67.3 percent.

With regards to sectorial distribution four sectors had their mean level of safety above the general mean. These were the Banking, Insurance, Shipping and the Manufacturing sectors. Levels of safety in these sectors came as result of the fact that employees were sufficiently

trained in safety procedures and taught to use personal protective equipment during work activities. Moreover, employees also made it the habit of reading instructions on tools and equipment and tried to obey all warning signs at work. Also, the environmental acts and the Ghana factories, office and shops acts make the adoption of safety measures mandatory in these formal sectors. The level of safe conditions in the banking sector was 76.20 percent. The level of safety in the insurance sector was also 72.54 percent, 72.21 percent level of safety in the shipping sector while the manufacturing sector recorded 68.1 percent. With the exception of the manufacturing sector, levels of safety that need to be addressed are less than 30 percent. The petroleum sector recorded a level of safety which was slightly below the mean level of safety provided. This observation could be attributed to external shocks since this sector is mandated to provide safety at the worksite. The building/construction sector had the least safety measures with 55.54 percent level of safety. It was obvious that since most construction/building sites were owned by private individuals, the adoption of safety measures was seen as a cost. Also, in a few places, although personal protective equipment were provided, most workers did not use them. This can be ascribed to their high level of illiteracy. Moreover, workers in these sectors fail to read instructions on tools and equipment at the construction sites hence fail to adhere to warning signs. A histogram displaying the mean level of safe work conditions as perceived by the employees is displayed in figure: 5.3.

Figure 5.3: Histogram showing the mean level of safety across industries

Source: Author's survey, 2013

5.4 Health and Safety Challenges (Risks)

The level of risk associated with one's role at work which could affect one's productivity was measured with an ordinal scale of measurement. According to Nsowah-Nuamah (2005), the ordinal scale of measurement incorporates the features of a nominal scale of measurement and can be ordered or ranked in an ascending order. The level of risk to safety and health were measured as none, little, large, very large and extremely large.

The results revealed that only 1.9 percent of the employees in the survey believe that there were no risks associated with their jobs which could interfere with their ability to deliver. 66.67 percent (that is 4 out of 6 employees) of the 1.9 percent employees were in the banking sector while the remaining percentage came from the insurance sector and none was recorded in the other sectors. 98.1 percent believe that there were risks associated with their work but were of varying views. These varying views were subject to several opinions on factors like chemical and non-chemical hazards in the working environment which could threaten their well-being and the adequacy of safety measures adopted. Moreover, the subtlety of certain conditions at the

work place like rays from computer screens, the state and nature of the staircases had influence on their choices of risk level. 25 percent indicated that their level of risk was little, 42.6 percent were of the view that theirs was high. 26.2 recorded a very high level of risk while the remaining 4.3 percent believe that their level of risk was exceedingly high. Table 5.2 indicates the proportion of employees per level of risk they perceive to be associated with at their workplace.

Table 5.2: Proportion of employees per level of risk

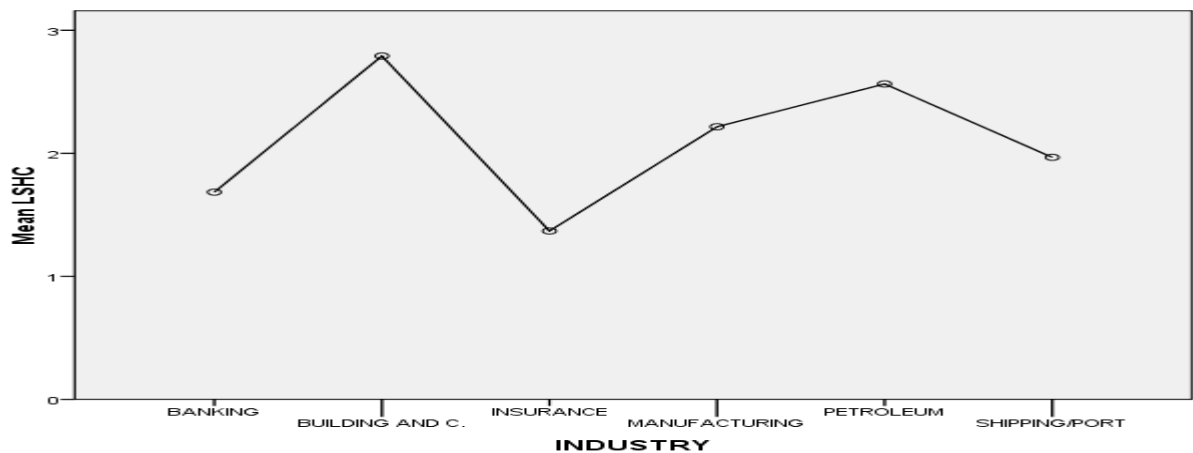
Level of safety and health challenges (Risk)	Percentage of the number of employees
None	1.85
Little	25
Large	42.60
Very large	26.23
Extreme large	4.32

Source: Author's survey, 2013

The variation in views within a sector can be attributed to different roles and stations within which employees found themselves in the organizations. It was clear in the survey that even in much riskier industries, there were safer places where some employees found themselves working. The Insurance sector recorded the least mean level of risk; since there were virtually little or no hazards in their work environment and activities performed by employees do not

necessary require rigorous physical movements. Moreover, safety is a mandate in this sector. The highest mean level of risk occurred in the building/construction sector. High altitudes at which workers found themselves working and the use of lifts in carrying heavy objects just above their heads are the factors which influence the choice of risk in this sector. Level of risk perceived by employees in the various sectors under study is presented in figure: 5.4.

Figure: 5.4 The level of risk by sector of industries



Source: Author's survey, 2013

5.5: Productivity

In assessing the productivity of workers, questions on attendance, quality of work performed, quantity of work done, ones' effort and one's concentration at work were asked. The attributes of labour productivity was ranked on a scale of 1 to 10. A score of one indicated a low level of work performance, while a score of 10 refers to a top worker performance.

It was therefore manifest from the results that the mean level of labour productivity was 6.52. This indicates that on average the delivery ability of employees is about 65.20 percent, thus about 34.8 percent below a top worker's performance. This level of delivery was observed owing to the health and safety challenges workers encounter hence they tend to accomplish less than what is expected. This draws from the fact that 94.1 percent of the employees strongly acknowledge that health and safety risks affect their optimal level of performance. Table 5.3 indicates the views of employees about how health and safety affects one's productivity. It is also evident that a large section of employees had their delivery abilities slightly below the mean performance. This is indicated by the direction and magnitude of the skewness statistics (-0.73). This distribution could be explained by the fact that just two out of the six sectors had health stock above the mean and this could interfere with the delivery of workers. This was however, bounded below at 2.8 and above by 10.

Table 5.3 Views on how safety and health risks affecting productivity (VSHP)

VSHP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YAL	305	94.1	94.1	94.1
	YBL	19	5.9	5.9	100.0
	Total	324	100.0	100.0	

Note: YAL=YES A LOT, YBL= YES BUT LITTLE

Source: author's survey, 2013

The mean level of labour productivity was higher for females than for males. This high level of performance in females could be validated to the fact that most females were much safer than males due to their compliance with safety rules and regulations with which their male counterparts mostly did not. Their levels of safety made them to have enough energy and therefore were much able to accomplish what was demanded of them unlike the case of men. Females' productivity was 70.2 percent while men registered a 62.2 percent level of productivity. Labour productivity was averagely good since the average labour productivity in all the sectors was above 50 percent. However, the mean labour productivity in the building/construction, manufacturing and petroleum sectors were below the general mean level of labour productivity. With the exception of the manufacturing sector which had a high level of safe conditions; levels of labour performance in the remaining sectors could be attributed to a low level of safety. However, the low level of labour performance in the manufacturing sector could be accounted for by other factors besides the safe conditions. Lack of incentives, requisite logistics, monitoring and supervisions of staffs are likely to be some reasons behind the low level of labour productivity in the manufacturing sector. For instance with lack of incentives, workers will feel that they are being cheated, meaning that their marginal product of labour exceeds their wage rate. Availability of logistics is also very key in the determination of one's performance since it is tools with which employees work. Table 5.4 shows the mean levels of labour productivity across sectors.

Table 5.4: Mean labour productivity by Sectors of Industry

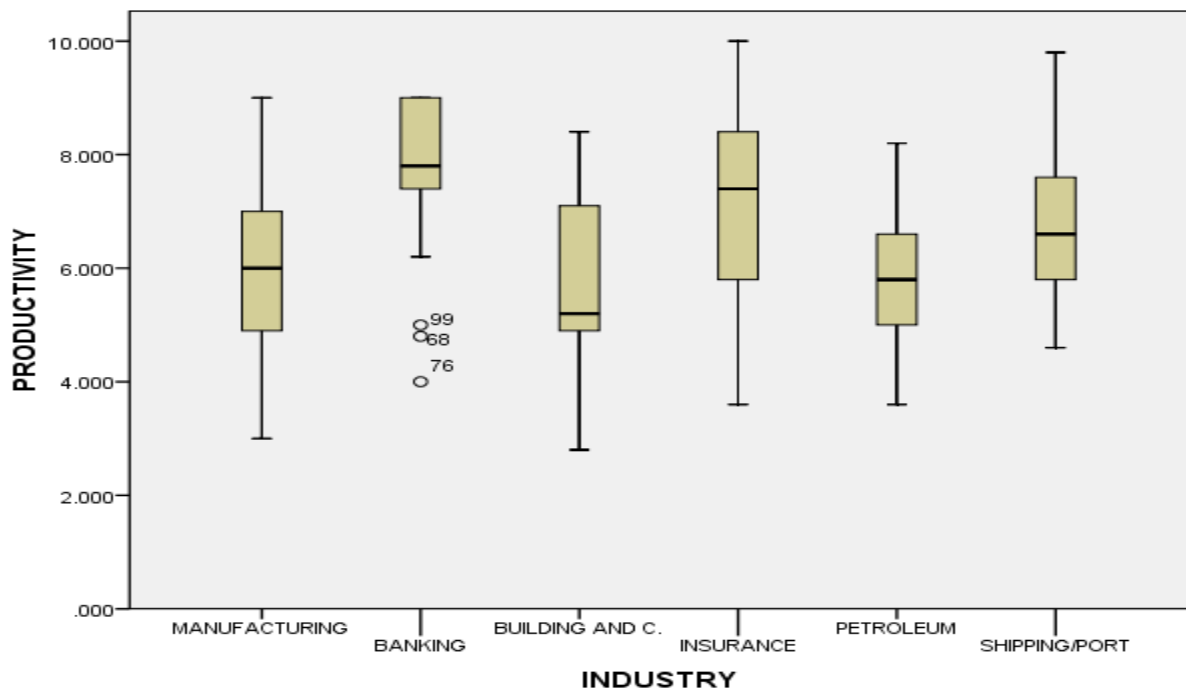
INDUSTRY	PRODUCTIVITY
Banking	7.85
Building/ Construction	5.66
Insurance	7.05
Manufacturing	5.84
Petroleum	5.78
Shipping/ Port	6.62
Total	6.52

Source: Author's Survey, 2013

The high level of productivity in the insurance and the banking sectors can first and foremost be ascribed to their high level of health and safety. This is because the environment is conducive therefore personnel put in high levels of effort and concentration. Moreover, due to the high remuneration and incentives in these sectors, workers, considering the high opportunity cost of losing their jobs, give off their best. Despite the fact that the mean labour productivity was highest in the banking sector, there were however, few employees whose productivity was low. This is observed from the negative outliers in figure 5.5. This observation can be recognized to the fact that the variation between safe conditions and health status of these few employees from other employees in the banking sector was great and this could have accounted for the observed

outliers hence the low performance. Labour productivity was also higher in the Insurance and Shipping/Port sectors since they had higher levels of safety. Availability of logistics, high levels of human relations and better incentive packages are other reasons which could be associated with the high level of productivity in these sectors.

Figure 5.5: Productivity Across Industries Indicating Outliers



Source: Author's survey, 2013

Among the five labour productivity measures used in scoring one's productivity in the study, attendance had the highest mean level. This was followed by the quantity of work performed. Concentration was the least labour productivity measure with a mean value of 6.10 and this was followed by the quality of one's job performance with a value of 6.24. Table 5.5 indicates the mean levels of these measures of productivity. This observation could be due to the fact that

among the proxies of labour performance, attendance is the most observable one, and as such could easily be noticed by an employer to determine an employee's wage rate.

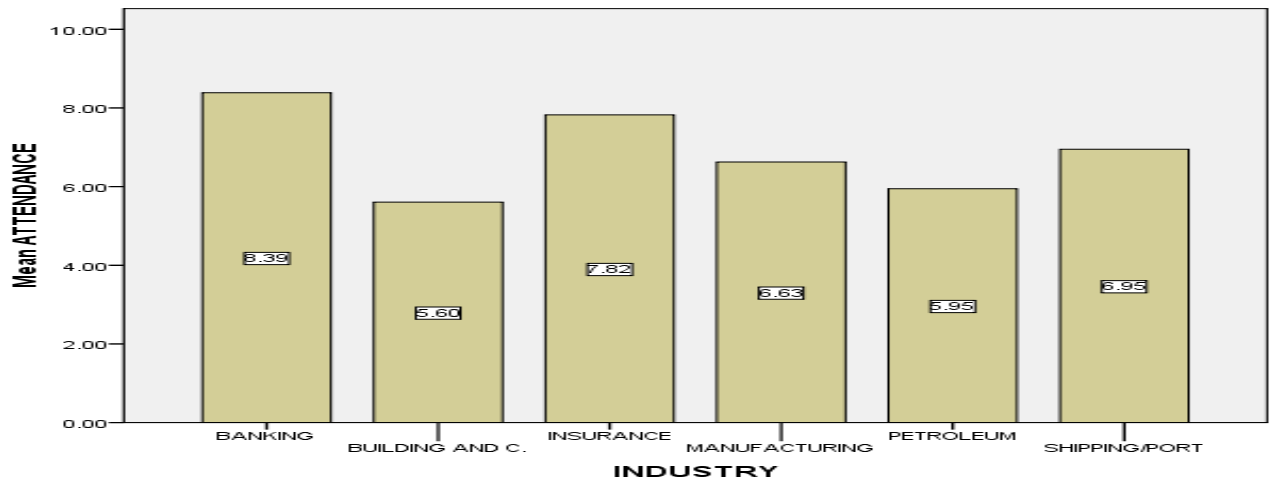
Table 5.5: Mean level of productivity measures

	Number of observation	Minimum	Maximum	Mean	Std. Deviation
ATTENDANCE	324	2.00	10.00	6.9568	1.75018
QUALITY	324	2.00	10.00	6.2438	1.73092
QUANTITY	324	2.00	10.00	6.7469	1.74118
CONCENTRATION	324	1.00	10.00	6.1019	1.85182
EFFORT	324	2.00	10.00	6.4630	1.76530
Valid N (list wise)	324				

Source: Author's Survey, 2013

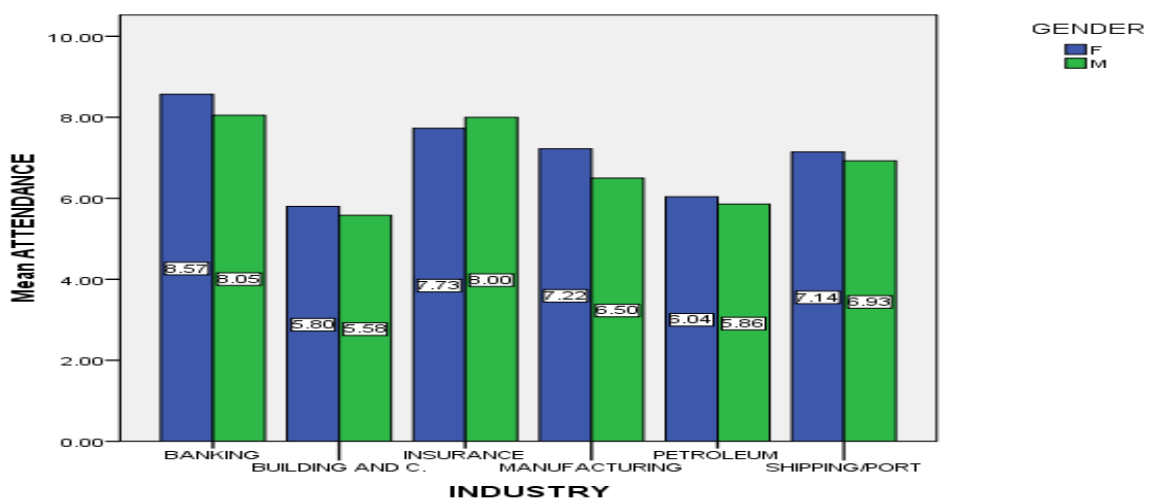
We can deduce from Table 5.5 that the average reporting rate at work was 69.57 percent of what is required. The attendance rates among staff were negatively skewed by a magnitude of 0.195. This implies that, proportionally, a large percent of employees' reporting rate was slightly below the 69.57 attendance rate. The non-reporting rate of 30.43 percent could be attributed to the health of the individual or the safety of the work environment since this has the propensity to cause ill health and consequently result in absenteeism. Moreover, factors like remunerations, job availability and the kind of firm ownership are very likely to influence attendance at work. It is therefore not surprising that attendance was high in the banking and insurance sectors since

these sectors were observed to adopt measures that improved the safety and health of their workforce. Moreover, employees under these sectors enjoyed better incentive packages. The management of privately-owned firms supervised their staff daily in order to meet customers' demand. The average reporting rates in these sectors were above the 67.57 percent mean attendance rate. A mean reporting rate of 83.86 percent in the banking sector while the insurance sector reported a rate of 74.25 percent. The average reporting rates in shipping/port and the manufacturing sectors were slightly below the average attendance rate. This can be ascribed to the fact that although they had good safety conditions, the health status of employees was below the average health stock. This hence resulted in the observed level of attendance. Moreover, most firms under the Shipping/Ports sectors are owned by the government and as such do have little or no supervision. Also, in the case of the manufacturing sectors, workers do enjoy days off due to the duty shift system that exists. This could also account for the observed level of attendance. Attendance was least in building/construction sectors where an attendance rate of 56.1 percent occurred. The level of attendance in the building/construction sector could be attributed to the fact that most workers were casual workers and as such report to work based on the availability of jobs and building materials. Figure 5.6 indicates the level of attendance by sectors of industry.

Figure 5:6 A Bar Plot Showing Mean Level of Attendance by Industries

Source: Author's survey, 2013

There were higher levels of attendance among females than males. Females' attendance rate was 74.59 percent as against 66.54 percent attendance rate by males. Variation in the level of attendance rate could also be attributed to the variation in safe conditions between both genders. Figure 5.7 indicates the level of attendance by gender across sectors of industry.

Figure 5.7: A cluster bar plot showing the mean level of attendance by industries and gender

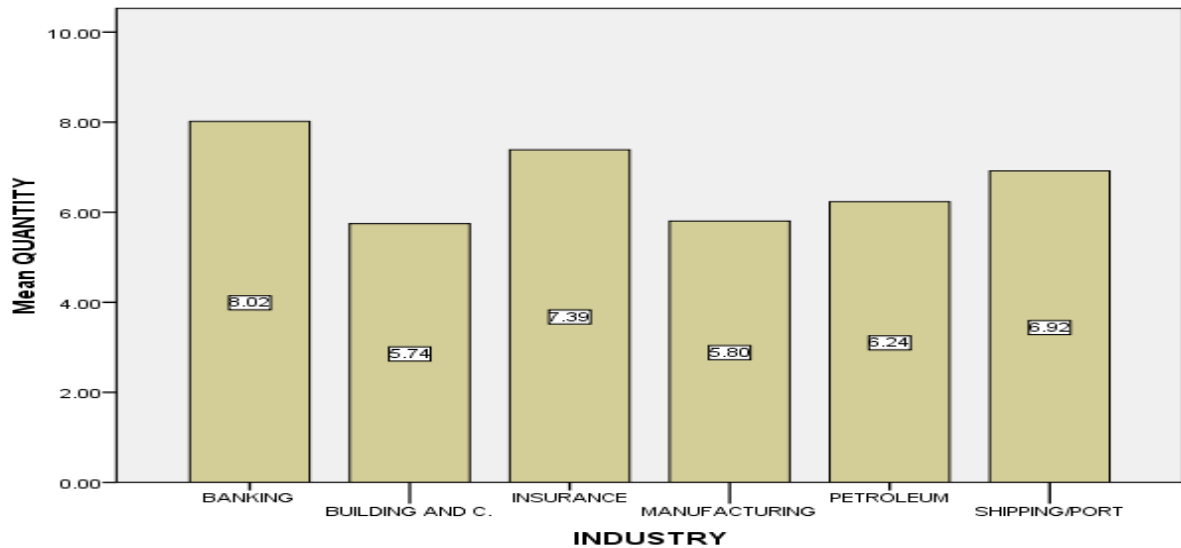
Source: Author's survey, 2013

From figure 5.7, we can notice that females generally had higher rates of attendance at work than their male counterparts across all the sectors. With the exception of the insurance sector where the attendance rate of males was higher than that of females, all the remaining sectors had females' attendance exceeding males' attendance.

Concerning the issue of work performed by all sectors, the average mean was 6.74. This indicates that averagely, the amount or volume of work performed by an employee is about 67.4 per cent of the amount of work that a top worker does. The distribution of the quantity of work performed by employees is negatively skewed by a magnitude of 0.17. This informs that a large proportion of workers had the amount of work performed to be less than what an average worker does. The amount or volume of work not done could be accounted for by a lot of factors of which the health and safety of an employee is part. From the analyses, the average quantity of work performed by employees in the banking, insurance and Shipping sectors seems to be higher than the average performance of employees. These observations could partially be attributed to the level of safety conditions. Moreover, due to high remuneration and the high level of supervision in these sectors, employees are compelled to work hard. Also the high opportunity cost of losing jobs in this sector is also likely to cause employees to give of their best. The average quantity of work performed by employees in the banking sector was 80.18 per cent. That of the insurance sector was 73.86 per cent while that of the shipping/port sector was 69.18 per cent. Due to the risky and the labour intensive in activities of the manufacturing, building/construction and petroleum sectors, the quantity or volume of work expected from them was below the average labour performance. Besides the labour intensity and level of safe conditions in these sectors, most firms in these sectors do not have modern logistics to boost productivity and also have low levels of remuneration. Averagely 57.44 percent quantity of work

was performed by employees in the building/construction sectors, 58.04 percent was registered in the manufacturing sector while 62.36 percent is the figure of the petroleum sector. Figure 5.8 shows the mean levels of volume of work done by the sectors.

Figure 5.8: Quantity of Work Performed by Sectors of Industry



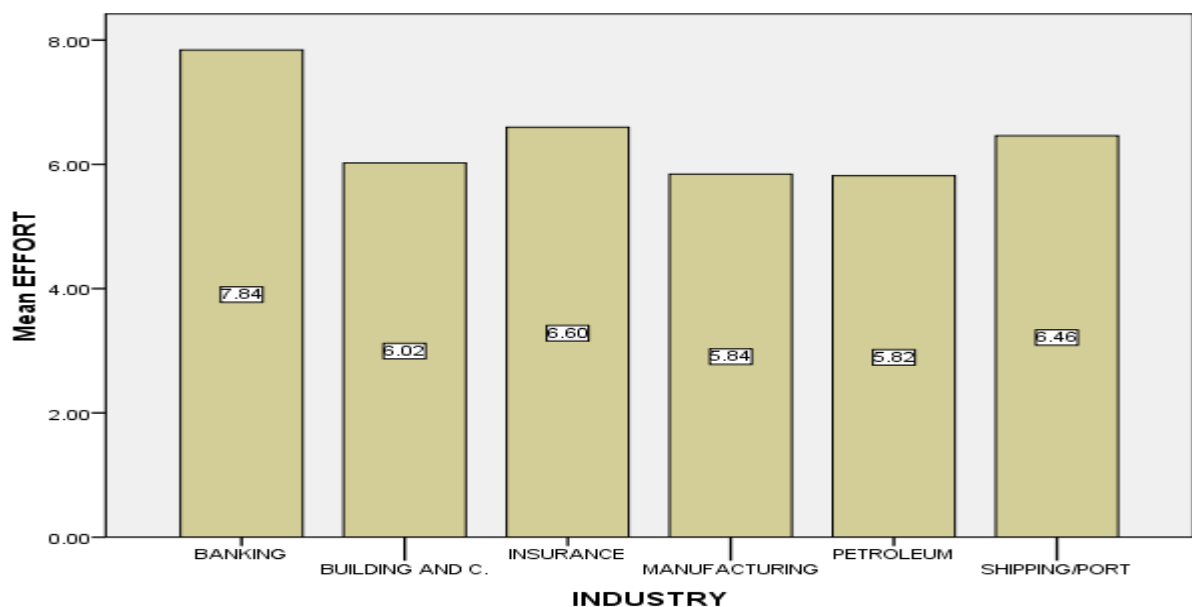
Source: Author's survey, 2013

Regarding the level of labour effort applied in the various sectors, the mean effort level was 64.63 percent of what is expected from a top worker. This is evident from table 5.5. Large proportions of employees' effort were below this value. This is indicated by the magnitude and direction of the skewness statistics (i.e. -0.076). The average level of effort exhibited by employees in the insurance and banking sectors were high since it was above the 64.63 percent mean value of effort. Effort which is less observable is most likely to be affected by one's passion for the kind of work. Nonetheless, this passion is also strongly influenced by the kind of working conditions including remuneration, health and safety conditions. It is not surprising that

with the level of remuneration, health status and safety in the banking and insurance sectors, there is a high mean level of effort. The banking sector had the highest value, with an average effort level of 78.42 per cent while the insurance sector had an average effort value of 65.96 per cent. Despite having effort levels below the average effort level, the building/construction and the shipping sectors had average mean values that were much closer to the cross-sector average effort value. The level of effort in the shipping sector besides other economic factors can be attributed to the level of safety and the closeness of its health status to the cross-sector health status. The closeness of the effort level in the building and construction sector to the cross-sector mean cannot be attributed to safety or the health status. It can however, be attributed to other factors such as the hourly wage since most workers are paid on daily per hour basis.

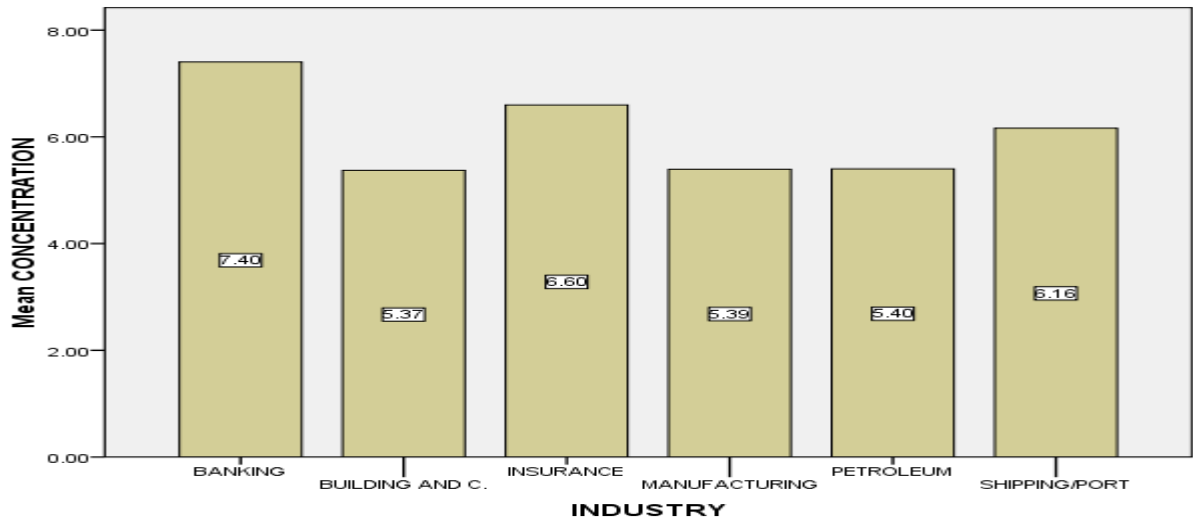
On the whole, the exhibition of effort towards work was good since the least mean effort was above 50 percent of what is expected of a top worker. The mean exhibition of effort per employee across sectors is presented in figure: 5.9.

Figure 5:9 A Box Plot Showing the Mean Level of Effort per Sector



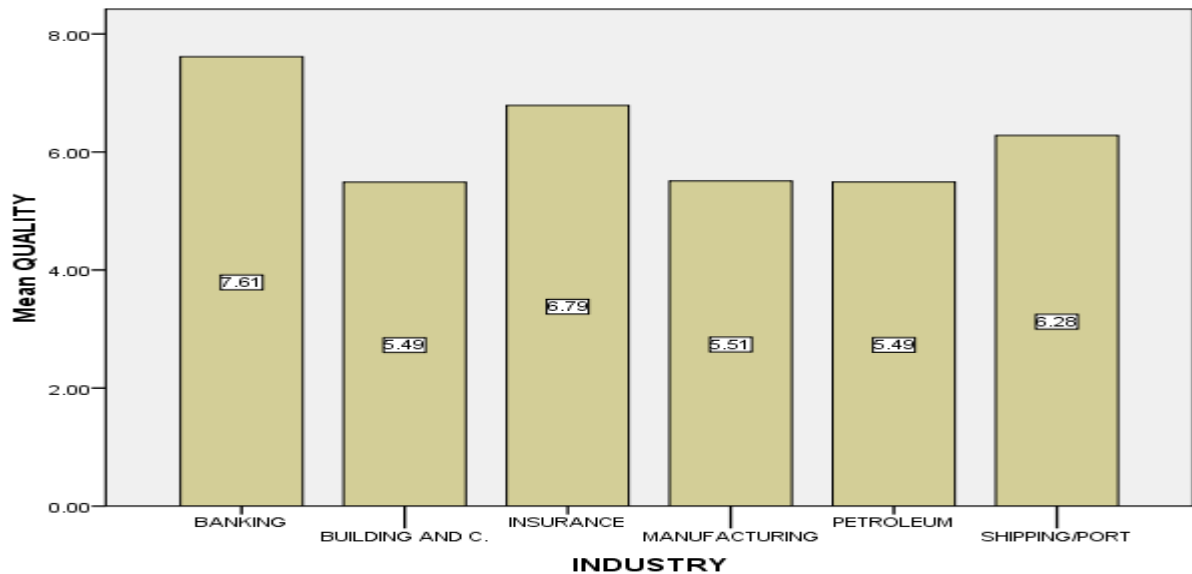
Source: Author's survey, 2013

With regards to employees' concentration across sectors, the average level of concentration was 61 per cent. Thus, approximately 40 per cent of obstructions occurred at work. This also evident from table: 5.5. Just like employee effort, the concentration level of a worker to some extent is not easily detectable by an employer. Factors such as domestic pressure and the health of a family member may have the ability to affect one's level of concentration. A greater number of workers had their levels of concentration above the mean value. This is indicated by the magnitude and direction of the skewness statistics (i.e. 0.006). In figure: 5.10 we present the results of the level of concentration across sectors. It is evident that unlike the distribution of effort across sectors, three sectors were observed to be above and three below the mean concentration level. The mean level of concentration in the petroleum, building/construction and manufacturing sectors were below the cross-sector value. Firstly, safe conditions were low in the petroleum and building/construction sectors due to inadequate compliance with safety measures. Conversely, there were adequate safety measures in the manufacturing sector. The level of concentration in this sector among all other factors can be attributed to the low average health stock, since this can cause low level of presenteeism. The shipping/port sector just like the manufacturing sector also had adequate safety measures and low level of health stock. It nevertheless had a higher level of concentration. This means that the level of concentration cannot only be attributed to safety and health but other factors as well. The level of incentive in the shipping/port sector could account for the higher level of concentration. The level of concentration in the banking and insurance sectors can be associated with the good level of safety and health status of the personnel.

Figure 5.10 Mean Level of Concentration Across Sectors

Source: Author's survey, 2013

We can deduce that the average quality of one's work was 62.44 per cent from Table 5.5. Employees' work quality was generally good since it was above 62.44 per cent. This is indicated by the distribution of the skewness statistics (0.056). Unlike effort and concentration, the quality of one's work can easily be judged by an employer. For this reason, it is likely to be influenced by the level of supervision and monitoring at work. Moreover, it is also mostly likely to be affected by the health and safety of an individual. It could therefore be shown that sectors with adequate safety measures and health stocks had levels of work quality above the cross-sector value of 62.44 per cent. This is displayed in figure 5.11 below:

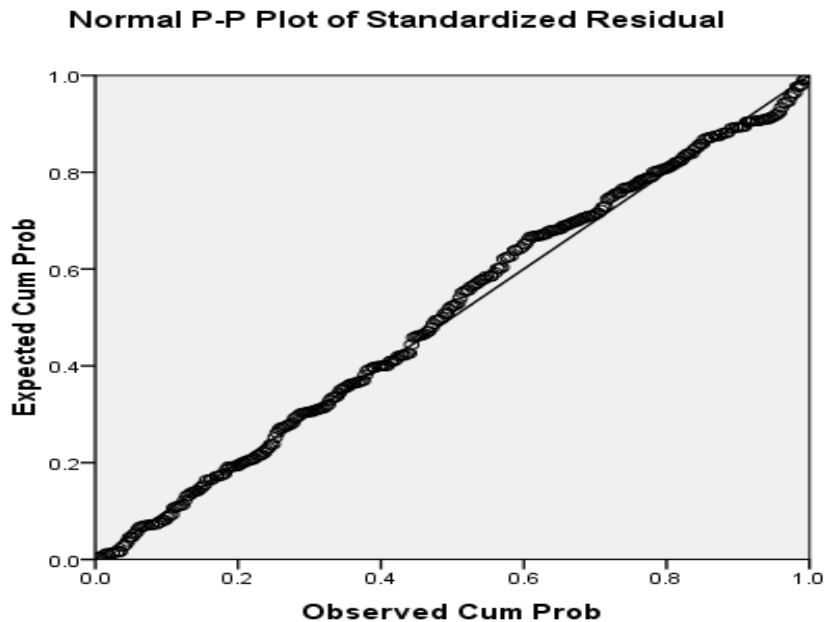
Figure 5.11 Mean Level of Quality per Sectors of Industry

Source: Author's survey, 2013

5:6 Discussions of the diagnostic tests

The empirical results from the univariate and multivariate results started with the diagnostic tests. It was done with the view to making the interpretation and inferences from the results reliable and valid. In this regard, a test for normality, multicollinearity, heteroscedasticity and model fit were carried out. We then proceed to discuss the univariate results which address objective one followed by a discussion of the multivariate results which tackles objective two.

In the normality test, the graphical method was chosen over the numerical method. The reason being that it offers us an appealing visualization over the numerical method which gives an objective criteria to determine normality (Park, 2008). The P-P plot illustrates that there is normality in the data sets since the observed residuals approximately fall on the unit slope.

Figure 5.12 P-P Plot of the Standardized Residuals

Source: Author's survey, 2013

For the multicollinearity test, the study utilizes both the correlation coefficient test and that of the variance inflation factor (VIF) test. The correlation coefficient value in Table 5.6 indicates that with the exception of gender and the interaction effect which have a correlation coefficient of 0.83, the others have an absolute value less than 0.8. This points out the absence of multicollinearity in such variables. The 0.83 correlation coefficient indicates the presence of multicollinearity between gender and the interaction effect. This level of multicollinearity is not serious since it is below 0.95. Therefore; the model does not suffer from the problem of multicollinearity. This test is best analyzed using the VIF test. A mean value of 8.41 is recorded as the variance inflation factor in the regressors of the model in Table 5.7. Since this level of VIF is less than 10, this implies that the model is free from multicollinearity.

Table 5.6 Results from the Correlation Coefficient Test

```
. correlate GENDER LSHC_LITTLE LSHC_LARGE LSHC_VERYLARGE LSHC_EXT_LARGE interracti~t HEALTH SAFETY
(obs=324)
```

	GENDER	LSHC_~LE	LSHC_LA~	LSHC_V~E	LSHC_E~E	interr~t	HEALTH	SAFETY
GENDER	1.0000							
LSHC_LITTLE	-0.0221	1.0000						
LSHC_LARGE	-0.1422	-0.4973	1.0000					
LSHC_VERYL~E	0.1594	-0.3443	-0.5137	1.0000				
LSHC_EXT_L~E	0.1025	-0.1227	-0.1830	-0.1267	1.0000			
interracti~t	0.8294	-0.3411	-0.1818	0.4246	0.3471	1.0000		
HEALTH	-0.0914	0.2375	0.0445	-0.2388	-0.1969	-0.2370	1.0000	
SAFETY	-0.0606	0.3102	0.1083	-0.3714	-0.1896	-0.2558	0.4342	1.0000

Source: Author's survey, 2013

Table 5:7 Result from the VIF test

```
. estat vif
```

Variable	VIF	1/VIF
LSHC_LARGE	14.98	0.066774
LSHC_VERYL~E	14.96	0.066859
interracti~t	11.07	0.090302
LSHC_LITTLE	11.04	0.090550
GENDER	7.26	0.137814
LSHC_EXT_L~E	5.20	0.192448
SAFETY	1.44	0.693590
HEALTH	1.30	0.766816
Mean VIF	8.41	

Source: Author's survey, 2013

Two tests were performed to diagnose the presence or absence of heteroscedasticity; these were the BreuschPagan/Cook – Weisberg test and the plot of the residual against the fitted values of the dependent variable. We can see from these two tests that heteroscedasticity was absent. From figure 5.13 the lack of trends in the plots and the absence of extreme outliers suggest the presence of equal variance in the data set. Moreover, the BreuschPagan/ Cook – Weisberg test also fails to reject the null hypothesis of equal variance. Since the calculated chi-square value from Breusch Pagan/ Cook – Weisberg test falls within the critical/acceptance region of 14.07.

Table 5.8 Results from the Breusch Pagan/ Cook – Weisberg Test for Heteroscedasticity

```
. estat hettest
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
```

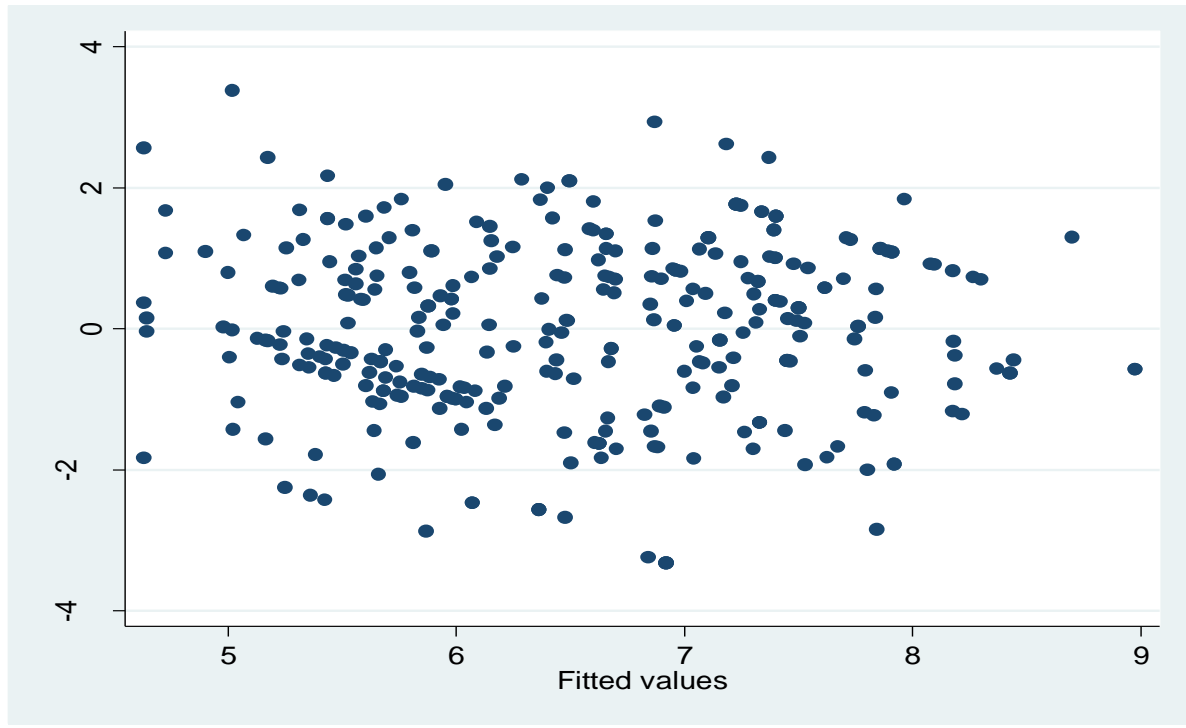
```
Ho: Constant variance
```

```
Variables: fitted values of PRODUCTIVITY
```

```
chi2(1) = 0.05
```

```
Prob > chi2 = 0.8165
```

Source: Author's survey, 2013

Figure 5:13 Residuals Plot Against Fitted Values

Source: Author's survey, 2013

In the diagnostic test of model fit, the model is fit since about 37.26 percent of the variability in the dependent variable is explained by the inclusion of the independent variables in the model. This is noticeable from the R-squared value in table 5.9.

5.7: Discussion of the univariate regression results

The overall regression is significant at 5 percent level. We can attest to this judging from the probability value of the F statistic in table 5.9.

Table 5:9 Results from the univariate regression estimates

```
. regress PRODUCTIVITY GENDER LSHC_LITTLE LSHC_LARGE LSHC_VERYLARGE LSHC_EXT_LARGE interactioneffect HEALTH SAFETY
```

Source	SS	df	MS	Number of obs =	324
Model	287.962087	8	35.9952608	F(8, 315) =	23.39
Residual	484.823469	315	1.53912212	Prob > F =	0.0000
				R-squared =	0.3726
				Adj R-squared =	0.3567
Total	772.785556	323	2.39252494	Root MSE =	1.2406

PRODUCTIVITY	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
GENDER	-.5777178	.3831833	-1.51	0.133	-1.33164	.1762044
LSHC_LITTLE	-.6345114	.5289556	-1.20	0.231	-1.675244	.4062212
LSHC_LARGE	-1.386276	.539397	-2.57	0.011	-2.447553	-.3249999
LSHC_VERYL~E	-1.588857	.6059277	-2.62	0.009	-2.781034	-.3966797
LSHC_EXT_L~E	-1.792119	.7726937	-2.32	0.021	-3.312412	-.2718261
interaction~t	-.0130924	.1806665	-0.07	0.942	-.368558	.3423732
HEALTH	.2096849	.0584606	3.59	0.000	.0946622	.3247075
SAFETY	.2720373	.0554624	4.90	0.000	.1629137	.3811608
_cons	4.80527	.7630195	6.30	0.000	3.304011	6.306529

All regressors with the exception of gender, little level of risk (LSHC_LITTLE) and the interaction effect between gender and risk are significant.

The result indicates that health and safety have positive effects on one's level of productivity in an organization. Both effects on labour productivity are significant at 5 percent level. This indicates that workers perceived their health and safety to significantly contribute to their

capacity to deliver at work. This finding is in line with empirical literature about the effect of health and safety on productivity. For instance, Bloom and Canning (2005) in finding how economic performance could be affected by health noticed that the improvement of the survival rate through improvement of health measures accounts for 2.8 percent of the economy's aggregate output. According to Lambert (2005), when there is an effective management of the safety of the work environment, there is the tendency to increase productivity beyond the initial observed level.

The coefficient estimate of 0.21 for Health means that, a unit improvement in the health stock will result in an increase in the level of productivity by a marginal value of 21 percent of what was initially observed. This comes with the assumption that one's level of safety and the nature of risk in the organization is constant. Table 5.12 in the appendix shows the univariate results by sectors. At the sector level, the health of the individual was very vital to the productivity of the workforce since all sectors with the exception of the manufacturing sector, recorded positive estimates of the effect of health on labour productivity. These effects were significant in the Banking and the Insurance sectors only at a significant value of 10 percent. The insignificant effect in the building, Shipping and the Petroleum sectors and the inconsistency in the manufacturing sector do not undermine the importance of health in one's delivery capacity in these sectors. This can be inferred from table 5.3 that about 94.1 percent of the respondents strongly believe that any health challenges could interfere with their optimal capacity.

The coefficient estimate of 0.27 for safety also means that, a unit improvement in safety will result in an increase in the level of productivity of the individual by a marginal value of 27 percent of what was initially observed. This comes with the assumption that one's level of health and the nature of risk are constant. This is consistent with findings. For instance, the American

Society of Safety Engineers, (2002) and Barefoot Economics (2005) noted that whenever safety is prioritized, there are increments in productivity since returns on safety investment exceeds its cost. Court (2003) also notes that safety enhances labour productivity due to reductions in injury, absenteeism and cost of compensation. From Table 5.12 in the appendix, workers perceived safety as an essential component in their ability to deliver. This is because there are marginal increments in one's level of productivity at work for any unit increase in safety measures. These marginal effects on one's level of productivity were significant in all sectors with the exception of the manufacturing and the building/construction sectors.

Productivity was higher among females than among males. This is due to the negative coefficient of gender as a regressor in the model. Since females were coded as zero, it indicates that if an additional female is added to the labour force, productivity will be higher than when a male is added. This observation is however not significant.

One's level of productivity falls as the level of risk associated with one's work increases. This was significant at all changes in the exception of a change from *None* to *Little*. This finding backs that of Akinyele (2007) that safe environments create a conducive atmosphere which ensures the well-being of workers. This allows them to exert their roles with all vigour that translates into higher productivity. Hence, as the level of risk increases, the working environment therefore is no longer conducive; the ability of workers to deliver dwindles. As the level of risk changes from *none* to *little*, an employee's productivity decreases by 63.45 percent. A change from *little* to *large* causes a 1.39 marginal loss in productivity. With a further increase in risk from *Large* to *Very Large*, productivity falls by a marginal value of 1.59 and this fall increases to 1.79 should risk finally switch to *extremely large*.

The insignificance of the interaction effect variable indicates that the ideal of males dominant in risky jobs does not hold in this analysis.

5.8: Discussion of the multivariate results

From table 5.10, the results show that the multivariate regression model is significant at 5 percent. This is because the F statistic of the individual univariate multiple regressions in the multivariate model have probability values less than an alpha value of 5 percent. This suggests that workers perceived safety and health to be vital to their productivity at work since it influences their attendance at work, motivates them to perform more volumes of work with attendant higher levels of work quality. It also increases their levels of effort and concentration in the discharge of their duties at work.

Table 5.10 Result of the Multivariate Regression Estimates

```
. mvreg ATTENDANCE QUALITY QUANTITY CONCENTRATION EFFORT = GENDER LSHC_LITTLE LSHC_LARGE LSHC_VERYLARGE LSHC_EXT_LARGE
> interactioneffect HEALTH SAFETY
```

Equation	Obs	Parms	RMSE	"R-sq"	F	P
ATTENDANCE	324	9	1.417037	0.3607	22.216	0.0000
QUALITY	324	9	1.432067	0.3325	19.6099	0.0000
QUANTITY	324	9	1.513092	0.2635	14.09026	0.0000
CONCENTRAT~N	324	9	1.609135	0.2636	14.09663	0.0000
EFFORT	324	9	1.577135	0.2216	11.20864	0.0000

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ATTENDANCE						
GENDER	-.274954	.4376745	-0.63	0.530	-1.136089	.586181
LSHC_LITTLE	-.7047058	.6041767	-1.17	0.244	-1.893438	.4840261
LSHC_LARGE	-1.462024	.6161029	-2.37	0.018	-2.674221	-.2498269
LSHC_VERYL~E	-1.764717	.6920947	-2.55	0.011	-3.126429	-.403004
LSHC_EXT_L~E	-2.036474	.882576	-2.31	0.022	-3.772963	-.299985
interracti~t	-.1455126	.2063585	-0.71	0.481	-.5515278	.2605026
HEALTH	.1362723	.0667741	2.04	0.042	.0048927	.2676519
SAFETY	.3368973	.0633495	5.32	0.000	.2122556	.4615389
_cons	5.417453	.871526	6.22	0.000	3.702705	7.132201
QUALITY						
GENDER	-.6758255	.4423168	-1.53	0.128	-1.546094	.1944432
LSHC_LITTLE	-.0994406	.610585	-0.16	0.871	-1.300781	1.1019
LSHC_LARGE	-.7763297	.6226377	-1.25	0.213	-2.001384	.4487247
LSHC_VERYL~E	-.8830371	.6994355	-1.26	0.208	-2.259193	.4931187
LSHC_EXT_L~E	-1.413132	.8919371	-1.58	0.114	-3.168039	.3417756
interracti~t	-.0112149	.2085473	-0.05	0.957	-.4215365	.3991068
HEALTH	.2706142	.0674823	4.01	0.000	.1378411	.4033873
SAFETY	.2919974	.0640214	4.56	0.000	.1660337	.4179611
_cons	3.424864	.88077	3.89	0.000	1.691928	5.1578
QUANTITY						
GENDER	-.4723344	.4673425	-1.01	0.313	-1.391842	.447173
LSHC_LITTLE	-.407359	.6451311	-0.63	0.528	-1.67667	.8619516
LSHC_LARGE	-.963137	.6578657	-1.46	0.144	-2.257503	.3312293
LSHC_VERYL~E	-1.17162	.7390086	-1.59	0.114	-2.625637	.2823965
LSHC_EXT_L~E	-1.405818	.9424018	-1.49	0.137	-3.260016	.4483793
interracti~t	-.150234	.2203466	-0.68	0.496	-.5837711	.2833031
HEALTH	.2306632	.0713004	3.24	0.001	.090378	.3709484
SAFETY	.1696726	.0676437	2.51	0.013	.0365821	.3027632
_cons	5.336767	.9306028	5.73	0.000	3.505784	7.16775
CONCENTRAT~N						
GENDER	-.5379967	.4970069	-1.08	0.280	-1.515869	.439876
LSHC_LITTLE	-.9594678	.6860805	-1.40	0.163	-2.309347	.3904117
LSHC_LARGE	-1.883847	.6996235	-2.69	0.007	-3.260373	-.5073214
LSHC_VERYL~E	-2.085916	.7859169	-2.65	0.008	-3.632226	-.5396057
LSHC_EXT_L~E	-2.150967	1.00222	-2.15	0.033	-4.122859	-.1790748
interracti~t	-.005007	.234333	-0.02	0.983	-.4660627	.4560487
HEALTH	.1662528	.0758262	2.19	0.029	.017063	.3154426
SAFETY	.2713548	.0719373	3.77	0.000	.1298164	.4128932
_cons	5.102372	.9896724	5.16	0.000	3.155168	7.049575
EFFORT						
GENDER	-.8668905	.4871233	-1.78	0.076	-1.825317	.091536
LSHC_LITTLE	-1.149693	.672437	-1.71	0.088	-2.472728	.1733428
LSHC_LARGE	-1.981716	.6857106	-2.89	0.004	-3.330868	-.632564
LSHC_VERYL~E	-2.202458	.770288	-2.86	0.005	-3.718018	-.6868984
LSHC_EXT_L~E	-2.106364	.9822899	-2.14	0.033	-4.039042	-.1736853
interracti~t	.1964272	.229673	0.86	0.393	-.2554598	.6483142
HEALTH	.2289102	.0743183	3.08	0.002	.0826872	.3751331
SAFETY	.2181049	.0705068	3.09	0.002	.0793812	.3568287
_cons	5.432065	.9699916	5.60	0.000	3.523583	7.340546

Source: Author's survey, 2013

The multivariate estimates show that a marginal increase in health holding, changes in the level of safety and risks constant, all other aspects of labour performance increase. These effects were significant at 5 percent level. These findings conform to the observation by Webb (1989) that the health of an individual makes such an individual physically and emotionally able to deliver. It also spurs the person to deliver better than his initial level of performance. This is because health improvements directly reduce absenteeism through the reduction in sickness and indirectly increase one's effort, concentration, volume and quality of work. The extent of the effect of health on dimensions of labour performance differed in the estimates. The quality of one's work benefits more from any health improvement while one's attendance benefits least. This observation can be supported by the fact that a sick person could physically be present at work, however, the quality, effort, concentration of such a person may be low. Such a person is likely to produce less output. Therefore, the adoption of health measures is likely to improve less observable factors more than the more observable factors. A marginal improvement in health leads to the following marginal increments; quality by 27.06 percent, quantity by 27.06 percent, effort by 22.89 percent, concentration by 16.63 percent whilst attendance goes up by 13.63 percent.

Another observation from table 5.10 is that the marginal increment of safety in the work environment also leads to significant improvements in the proxies of labour productivity. This finding conforms to the individual observations made by Webb (1989) and Macleod (1995). In his case study, Webb (1989) observed a 1000 percent increment in the level of productivity when physical and mechanical changes were undertaken in order to improve the safety of workers in a firm. Also, Macleod (1995) also observed that there is always better fit among humans and tools whenever safety is improved in an organization. This results in an effective match between

workers and tools. Workers become able to produce more output with less human effort. Just like the multi-effect of health, safety also had multi-effects on labour performance. Unlike health, the safety of the work place had a higher impact on one's attendance level than the other factors. This is because a high level of safety is firstly associated with few incidences of injury and this therefore creates a conducive environment which then leads to a higher delivery of employees. Therefore, marginal increments in these proxies due to a unit increment in safety are as follows; 33.69 percent in the attendance level, 29.20 percent in the quality of work performed, 27.13 percent in the level of concentration, 21.81 percent in one's level of effort and 16.97 percent in the quantity of work.

5:9: Inferential statistics

According to Nsowah-Nuamah (2005) an inferential statistics is concerned with drawing conclusions regarding all information of interest on the basis of a small part of that information. Therefore, in addressing the third objective (i.e. determining the significance of the effect of health and safety on labour productivity across firms of the study); a one-way ANOVA test was conducted. Table 5.11 shows the ANOVA of the effect of health and safety on labour productivity.

Table 5.11: Result from the Anova Test Estimate

```
. anova PRODUCTIVITY GENDER LSHC_LITTLE LSHC_LARGE LSHC_VERYLARGE LSHC_EXT_LARGE interactioneffect HEALTH SAFETY, part
> ial
```

```
Number of obs = 324 R-squared = 0.8970
Root MSE = .96223 Adj R-squared = 0.6130
```

Source	Partial SS	df	MS	F	Prob > F
Model	693.159308	237	2.92472282	3.16	0.0000
GENDER	.361196492	1	.361196492	0.39	0.5339
LSHC_LITTLE	.597339301	1	.597339301	0.65	0.4241
LSHC_LARGE	.66722402	1	.66722402	0.72	0.3983
LSHC_VERY~E	.094924314	1	.094924314	0.10	0.7496
LSHC_EXT_~E	.161355328	1	.161355328	0.17	0.6774
interaction	2.18883953	4	.547209881	0.59	0.6700
HEALTH	218.506893	115	1.90005994	2.05	0.0003
SAFETY	203.35748	113	1.79962372	1.94	0.0007
Residual	79.6262472	86	.925886595		
Total	772.785556	323	2.39252494		

Source: Author's survey, 2013

From Table 5.11 above, the probability values demonstrate that the effects of health and safety on productivity were not significantly different across the various sectors of firms. This can be explained by the fact that the test fails to reject the null hypothesis. The effect is same across all sectors of industry. The above results indicate that the effect of safety and health on labour productivity is not sector specific.

5.10 Summary of findings

From the on-going analysis, the health and safety status of the work force cannot be said to be poor. However, majority of the sectors needs to strengthen policies on health and safety in their organisations in order to have good performance indicators. The reason is that the good labour performance indicators of some sectors were ascribed to their high levels of safety conditions in the organisation and the health status of their work force. Thus, for high expectation of labour productivity, employers need to integrate policies on health and safety in organisations' mission and vision.

The foregoing results also clearly indicate that one's level of health and safety in an organization is vital to the ability to deliver. A unit change in either safety or health significantly increases one's level of attendance, quality and quantity of output, the levels of effort and concentration at work. These effects are not organization specific but are significantly same across sectors. Another major finding from the analysis is that, the level of risk associated with one's work negatively affects one's delivery capacity. These are significant for all levels of risk except a change from *none* to *little*.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

This chapter concludes the study by presenting a summary of the major findings from the study and further draws some recommendations for policy implementation. The chapter ends by outlining some limitations of the study.

6.1 Summary of major findings

Negative effects of health and safety on the delivery abilities of employees have been a major source of growth drag in most economies. The loss of lives, higher levels of disability adjusted life years (DALY's), reduction in productivity, high indirect and direct cost, are some of the consequences of these negative sides of health and safety. Despite numerous attempts by researchers and policy makers to combat this menace, it still prevails in most economies. For instance in Ghana, in spite of the governmental and non-governmental agencies in promoting safe and healthy work, these negative sides of health and safety has led about 2.3 million productive days lost due absenteeism, occupational injury is currently reported to be the 6th highest morbidity case in the country and this cost the country about 7 percent of its GDP.

Findings indicate that these negative implications of health and safety in the country can be attributed to the fact that; there are no single policy on occupational safety and health. Besides the labour act fails to identify a sole institution to empower to monitor, evaluate and control this menace.

Therefore, this study seeks not only to add to the volume of works done in this area by estimating costs or loss in productivity hours associated with these negative health and safety conditions which are intensively studied, but also to address how health and safety will impact on the delivery abilities of an employee. Impacts on one's level of attendance, quality, quantity, concentration and the level of effort are identified as effects. Using the (univariate and multivariate) multiple regression method, the study was conducted in the greater Accra region of Ghana using 324 employees from six sectors of industries. Information on their health, safety and productivity measures were elicited through the administration of questionnaires.

Findings evident from the survey indicates that generally, the health and safety statuses were good but sectors such as building/construction, petroleum, shipping and manufacturing had poor health statuses. The reason ascribed to this observation was the lack of medical care incentives (which however were given to particular groups of workers) and the low level of remuneration which constrained workers to the demand of health care. However, majority of the sectors had good safety indicators; these levels of safety was also ascribed to the mandatory nature of the factories, office and shop acts, the environment acts and other reasons such as level of remuneration. Another finding was that sectors with a high level of labour productivity owe it to their level of safety and health while those with low performance indicators have low levels of health and safety.

Findings from the study also indicate that the health and safety status of employees had direct impacts on their delivery abilities in the form of attendance, quantity, quality, effort and concentration at work. A positive unit change in either safety or health status of an employee resulted in a marginal increment in these proxies. The results further indicated that although health initiatives increase all proxies, its impact was higher in one's quality of work and lower in

one's attendance. The reason given for this finding was that, a person may physically be present at work but because he/she is sick, his/her quality, effort, concentration will be low. Hence, health improvement is much likely to improve one's quality of work than one's attendance rate. In the case of safety initiatives, it was rather the attendance that seeks to benefit more than other proxies. The study sought to show the level of risk associated with one's work. The findings indicate that there is significant reduction in productivity whenever the risk associated with one's work rises to a higher level. These reductions in productivity were significant at 5 per cent for any changes in the risk with the exception of a change from None to Little.

The study further investigated whether the impact of safety and health on productivity were significantly different across Ghanaian industries. The results indicate that the impact is significantly the same across industries; however, the extent of the impact varies across firms. This is indicated by the various magnitudes of the coefficients of the health and safety variables in the univariate multiple regression model.

The effect of Gender on productivity was not found to be significant. The interaction effect variable, whose aim was to capture the ideal of whether males were associated with much riskier jobs than their female counterparts as reported in literature, was also not significant. It is hence concluded that both genders can be found in any kind of job whether risky or not.

6.2 Conclusion

The significance of the study is to highlight the impact of one's health and the safety of one's organisation on one's delivery capacity, this has been achieved. It is evident that about 21 and 27 percent of the variability in employees' productivity can be accounted by one's health and the safety of the organisation respectively. Health and safety initiatives positively impact on one's attendance, quality, quantity, effort and concentration levels. However, the quality of one's performance benefits more from health initiatives whilst one's attendance benefits more from safety initiatives. It was also evident that impacts of health and safety on labour productivity were not organisation specific.

6.3 Recommendations

From the findings, I propose the following as recommendations for policy:

- Health care incentives should cover all categories of the work force.

From these findings, it was observed that the low mean health stock of some sectors was accounted for by the fact that a certain category of the work force was not covered with medical care incentives. Therefore, for high mean level of productivity to be observed in such organisations, it is recommended to extend health care incentives to all workers. This will achieve the goal of reducing the constraint on the demand for health care and the promotion of the well-being of individuals. These measures will finally result in improved labour productivity.

- Better evaluation, monitoring and control of risk

From the results, high levels of risk which affect the health and safety of an individual at work are associated with losses in productivity. These levels of productivity can be reduced or even eliminated should government pass laws that will regulate the amount of risk associated with certain work activities.

- Establishment of Occupational Safety and Health Offices in Organizations

From the results, health and safety has a direct impact on labour productivity; the institution of OSH offices in every kind of organization will hence be beneficial to firms' operations. This is to provide rules and guidelines that will safeguard every worker in the organization in order to boost firms' performance

- A reform of the occupational health and safety law as stipulated in the Ghana labour Acts

It is evident from the findings that health and safety are vital to the productivity of employees and this can positively affect economic growth, since the sustainability of the economy depends on the productivity of its work force. One can therefore hope that a reformation of the act to empower a single agency, institution or body will enable this linkage to be realised since it will serve as checks on the proposed establishment of OSH offices in organisations.

6.4 Limitations of the study

A major impediment of this research is that the sample size seems inadequate considering the number of employees in the Greater Accra Region of Ghana. Despite this constraint, by the principle of inferential statistics, the study can be used for purposes of reference and policy implementation.

6.5 Direction for future research

Form the foregoing results, it is observed that health and safety is vital to labour productivity. A recommendation for future research will involve conducting a cross-country analysis between low and high-income countries in order to assess the impact of safety and health on economic growth. This is geared at knowing whether the improvement of health and safety indicators in low-income countries will allow such countries to converge in economic growth at par with advanced economies.

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APPENDIX

Table: 5.12 Univariate regression results by sectors of industry

. by INDUSTRY, sort : regress PRODUCTIVITY GENDER LSHC_LITTLE LSHC_LARGE LSHC_VERYLARGE LSHC_EXT_LARGE interactioneffect
> HEALTH SAFETY

-> INDUSTRY = BANKING

Source	SS	df	MS			
Model	52.5922447	8	6.57403059	Number of obs =	57	
Residual	23.0498605	48	.480205427	F(8, 48) =	13.69	
Total	75.6421053	56	1.35075188	Prob > F =	0.0000	
				R-squared =	0.6953	
				Adj R-squared =	0.6445	
				Root MSE =	.69297	

PRODUCTIVITY	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
GENDER	-.2068677	.5727484	-0.36	0.720	-1.358455	.94472
LSHC_LITTLE	.8202795	.4466725	1.84	0.072	-.0778158	1.718375
LSHC_LARGE	.5149961	.4865579	1.06	0.295	-.4632941	1.493286
LSHC_VERYL~E	.620093	1.152447	0.54	0.593	-1.697057	2.937243
LSHC_EXT_L~E	.1103237	1.571457	0.07	0.944	-3.049303	3.269951
interracti~t	-.3532774	.4418959	-0.80	0.428	-1.241769	.5352138
HEALTH	.3846096	.0901143	4.27	0.000	.2034226	.5657965
SAFETY	.3380884	.0914247	3.70	0.001	.1542667	.5219102
_cons	1.978143	1.094283	1.81	0.077	-.222061	4.178346

-> INDUSTRY = BUILDING AND C.

Source	SS	df	MS			
Model	13.7605885	7	1.96579835	Number of obs =	43	
Residual	61.0822022	35	1.74520578	F(7, 35) =	1.13	
Total	74.8427907	42	1.78197121	Prob > F =	0.3692	
				R-squared =	0.1839	
				Adj R-squared =	0.0206	
				Root MSE =	1.3211	

PRODUCTIVITY	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
GENDER	-.610149	3.531815	-0.17	0.864	-7.780114	6.559816
LSHC_LITTLE	(dropped)					
LSHC_LARGE	-2.006399	1.927595	-1.04	0.305	-5.919625	1.906826
LSHC_VERYL~E	-2.064009	2.915136	-0.71	0.484	-7.98205	3.854032
LSHC_EXT_L~E	-2.902258	4.3047	-0.67	0.505	-11.64126	5.836749
interracti~t	.2938223	1.323737	0.22	0.826	-2.393506	2.98115
HEALTH	.1785875	.2745652	0.65	0.520	-.3788094	.7359844
SAFETY	.0787257	.2998341	0.26	0.794	-.5299699	.6874214
_cons	5.960665	3.588002	1.66	0.106	-1.323367	13.2447

-> INDUSTRY = INSURANCE

Source	SS	df	MS			
Model	48.8803581	7	6.98290829	Number of obs =	57	
Residual	92.9217472	49	1.89636219	F(7, 49) =	3.68	
Total	141.802105	56	2.53218045	Prob > F =	0.0028	
				R-squared =	0.3447	
				Adj R-squared =	0.2511	
				Root MSE =	1.3771	

PRODUCTIVITY	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
GENDER	-.2729917	1.289095	-0.21	0.833	-2.863526	2.317542
LSHC_LITTLE	-1.928817	1.108011	-1.74	0.088	-4.155448	.2978133
LSHC_LARGE	-3.016833	1.108795	-2.72	0.009	-5.24504	-.7886251
LSHC_VERYL~E	-3.750206	1.42015	-2.64	0.011	-6.604105	-.8963071
LSHC_EXT_L~E	(dropped)					
interracti~t	-.0259826	.9956105	-0.03	0.979	-2.026737	1.974772
HEALTH	.3637069	.1895336	1.92	0.061	-.0171752	.744589
SAFETY	.3321569	.1548098	2.15	0.037	.0210551	.6432588
_cons	4.251346	2.011723	2.11	0.040	.2086385	8.294054

Table:5.7 Univariate regression results by sectors of industry (cont.)

-> INDUSTRY = MANUFACTURING

Source	SS	df	MS	Number of obs =	51
Model	35.3495086	7	5.0499298	F(7, 43) =	2.16
Residual	100.386962	43	2.33458051	Prob > F =	0.0569
				R-squared =	0.2604
				Adj R-squared =	0.1400
Total	135.736471	50	2.71472941	Root MSE =	1.5279

PRODUCTIVITY	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
GENDER	-.6368713	1.388313	-0.46	0.649	-3.436672 2.162929
LSHC_LITTLE	1.474288	1.7247	0.85	0.397	-2.0039 4.952476
LSHC_LARGE	.2764384	1.34573	0.21	0.838	-2.437484 2.990361
LSHC_VERYL~E	.211495	1.010211	0.21	0.835	-1.82579 2.24878
LSHC_EXT_L~E	(dropped)				
interracti~t	-.0853087	.6018834	-0.14	0.888	-1.299122 1.128505
HEALTH	-.1960363	.1876772	-1.04	0.302	-.5745235 .1824509
SAFETY	.1756013	.1605289	1.09	0.280	-.1481362 .4993388
_cons	6.141804	1.61478	3.80	0.000	2.88529 9.398318

-> INDUSTRY = PETROLEUM

Source	SS	df	MS	Number of obs =	55
Model	15.5156509	7	2.21652155	F(7, 47) =	2.09
Residual	49.7861673	47	1.05928016	Prob > F =	0.0629
				R-squared =	0.2376
				Adj R-squared =	0.1240
Total	65.3018182	54	1.20929293	Root MSE =	1.0292

PRODUCTIVITY	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
GENDER	.3223132	1.141237	0.28	0.779	-1.97356 2.618187
LSHC_LITTLE	-.0562868	1.226689	-0.05	0.964	-2.524067 2.411493
LSHC_LARGE	-.4435332	.8352603	-0.53	0.598	-2.12386 1.236794
LSHC_VERYL~E	-.0465584	.7077001	-0.07	0.948	-1.470267 1.37715
LSHC_EXT_L~E	(dropped)				
interracti~t	-.2915647	.4362642	-0.67	0.507	-1.169215 .5860857
HEALTH	.1377417	.1115599	1.23	0.223	-.0866878 .3621712
SAFETY	.3984858	.1506811	2.64	0.011	.0953546 .701617
_cons	2.945349	1.14576	2.57	0.013	.6403777 5.250321

-> INDUSTRY = SHIPPING/PORT

Source	SS	df	MS	Number of obs =	61
Model	20.2406716	6	3.37344527	F(6, 54) =	3.28
Residual	55.5271972	54	1.02828143	Prob > F =	0.0080
				R-squared =	0.2671
				Adj R-squared =	0.1857
Total	75.7678689	60	1.26279781	Root MSE =	1.014

PRODUCTIVITY	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
GENDER	.8694347	1.518502	0.57	0.569	-2.174978 3.913847
LSHC_LITTLE	(dropped)				
LSHC_LARGE	-.1675417	.8162915	-0.21	0.838	-1.804108 1.469024
LSHC_VERYL~E	.4584256	1.749482	0.26	0.794	-3.049074 3.965925
LSHC_EXT_L~E	(dropped)				
interracti~t	-.5183426	.9009571	-0.58	0.567	-2.324653 1.287968
HEALTH	.0605449	.1139622	0.53	0.597	-.1679356 .2890254
SAFETY	.3154523	.093321	3.38	0.001	.128355 .5025496
_cons	4.120925	1.042741	3.95	0.000	2.030355 6.211495

Source: Author's survey, 2013

UNIVERSITY OF GHANA-GRADUATE SCHOOL**ECONOMICS DEPARTMENT (MHPIL –ECONOMICS)****TOPIC: The effects of occupational safety and health on labour productivity**

Hello, this on-going research conducting by Mr. Adjotor, N. Franklin in partial fulfilment for a Master of Philosophy Degree in Economics from the University of Ghana. I am interviewing workers with the aim of accessing how health and safety affect workers' productivity. I will be very glad if you could honestly respond to the following questions. Please be assured that information provided would not in any way be linked to you and would be treated with utmost confidentiality.

Kindly indicate your gender by underlining: Male, Female

Please underline the firm category which best describes the nature of operations of your organization.

Banking

Building and civil engineering

Insurance

Manufacturing

Petroleum

Shipping

Part 1: Health

Instructions: this survey asks of your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. Answer every question by marking the answers as indicated. If you are unsure about how to answer a question, please give the best answer you can.

1. In general, would you say your health is (circle one)

Excellent.....1

Very good.....2

Good.....	3
Fair.....	4
Poor.....	5

Does your health limit you in the below activities? (circle one)

2. Moderate activities, such as: moving a table, chair, or playing football:

- Yes, limited(3)
 Yes, limited a little.....(2)
 No, not limited at all.....(1)

3. Climbing several flights of stairs:

- Yes, limited a lot(3)
 Yes, limited a little.....(2)
 No, not limited at all.....(1)

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?(circle one)

4. Accomplished less than you would like:

- Yes.....(2)
 No.....(1)

5. Were limited in the kind of work or other activities:

- Yes.....(2)
 No.....(1)

During the past 4 weeks, were you limited in the kind of work you do or other regular activities as a result of any emotional problems (such as feeling depressed or anxious)? (circle one)

6. Accomplished less than you would like:

Yes.....(2)
 No.....(1)

7. Didn't do work or other activities as carefully as usual:

Yes.....(2)
 No.....(1)

8. **During the past 4 weeks, how much did pain interfere with your normal work?**

(including both work outside the home and housework) (circle one)

Not at all.....1
 A little bit2
 Moderately.....3
 Quite a bit.....4
 Extremely.....5

How much of the time during the past 4 weeks... (Circle one)

9. Have you felt calm and peaceful?

All of the time.....1
 Most of the time.....2
 Some of the time.....3
 A little of the time.....4
 None of the time.....5

10. Did you have a lot of energy?

All of the time.....1
 Most of the time.....2
 Some of the time.....3
 A little of the time.....4
 None of the time.....5

11. Have you felt downhearted and depressed?

All of the time.....1
 Most of the time.....2
 Some of the time.....3
 A little of the time.....4
 None of the time.....5

12. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities? (like visiting with friends, relatives, etc.) (Circle one)

- All of the time.....1
 Most of the time.....2
 Some of the time.....3
 A little of the time.....4
 None of the time.....5

Part two: Safety

Purpose: this is to identify your safety status in your organization.

Direction:

1. Please answer every question to the best of your knowledge.
2. Place a check mark or tick in the appropriate column.

	Do not know	Never	Rarely	Sometimes	Usually	Always
a. Are safety procedures developed?						
b. Are safety procedures satisfactory?						
c. Are employee sufficiently trained in safety procedures and in using personal protective equipment at work?						
d. Are follow-ups or refresher safety training provided?						
e. Are safety problem regularly identified and reported						
f. Are identified safety problem properly analyzed and solved in a timely manner?						
g. Are there proper repairs of facilities and equipment before and after using them?						

	Yes	Yes but limited	No
h. Do you know what to do if exposed to hazards at work?			
i. In an emergency do you know where to go after evacuating the office?			
j. Do you read instructions on tools and equipment before using them at work?			
k. Do you obey all warning and prohibiting signs on equipment and at work?			
l. Do you know who to ask if you have any safety related questions?			

Part 3: labour productivity/performance

1 Are you of the view that health and safety hazards could affect one's optimal level of productivity/performance at work?

(a) Yes a lot (b) Yes but little (C) Uncertain (D) No not at all

2 Please indicate the level of health and safety challenges/hazards that you normally encounter with your work

(a) None (b) Little (c) Moderate (d) Large (e) Extremely large

3 With the indicate level of health and safety challenges, how much did it affect the following productivity measures over the past 4 weeks:

a. Your attendance at work?

1 2 3 4 5 6 7 8 9 10

Very little.....extremely large

b. The quality of your job performance?

1 2 3 4 5 6 7 8 9 10

Very little.....extremely
large

c. The amount or quantity of your work load you did?

1 2 3 4 5 6 7 8 9 10

Very little.....extremely large

d. Your concentration level at work?

1 2 3 4 5 6 7 8 9 10

Very little.....extremely large

e. Your effort level at work?

1 2 3 4 5 6 7 8 9 10

Very little.....extremely large

4 On the scale of one (1) to ten (10) where 1 is the worst performance of a worker and 10 the performance of the top worker, how will you rate your normal job performance should safety and health hazards not be associated with your work?

1 2 3 4 5 6 7 8 9 10

Very Low..... Very High