**UNIVERSITY OF EDUCATION, WINNEBA**

**COLLEGE OF TECHNOLOGY EDUCATION, KUMASI**

# ASSESSMENT OF OCCUPATIONAL HEALTH AND SAFETY PRACTICES AT SOKOBAN WOOD VILLAGE IN THE ASHANTI REGION OF GHANA

**BY**

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# DECLARATION

## STUDENT'S DECLARATION

I, Naah Eric Mustapha, declare that this Dissertation, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE: ……  DATE: ……

## SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with guidelines for supervision of Dissertations as laid down by the University of Education, Winneba.

SIGNATURE: ……  DATE: ……

Prof. Stephen Jobson Mitchual

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## DEDICATION

To my wife, Naah Rahamata, my sons Naah-Ut-baan, Naah Al-Hitaam, and NaahMafaaz for their moral support during my stay in the University of Education, Winneba - Kumasi Campus.

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## ABSTRACT

This study assessed the occupational health and safety practices of wood workers at the wood processing industry in Sokoban Wood Village. The study assessed the safety practices of the wood workers as well as the safety gargets of machines and equipment used at the wood village. The researcher adopted a descriptive survey research design. This design was used to sample opinions of workers at the Sokoban wood village. Data was collected from 247 respondents at the wood village Kumasi using a 5-point Likert-type scale questionnaire. Descriptive statistics was used for the data analysis. The results indicated that the respondents rated very high their awareness of occupational health and safety practices related to their work. The mean ratings of the respondents' awareness of health and safety practices ranged from 3.14 to 5.92 which is higher than the theoretical mean of 3.0, and the resultant mean was 4.76. Majority of the respondents also indicated that most of the machines used at the wood village were without safety gargets. Furthermore, the educational background of the respondents has no significant influence on their rating of awareness of health and safety practices. The study concluded that the workers at the wood village are not ignorant about safety and health practice related to their work. They express their willingness to use personal safety clothing and equipment with the exception of face shield. The study recommended that further studies should be conducted to cover infection and diseases related to wood processing and the use of health and safety equipments be encouraged among wood workers to reduce hazards and injuries associated with wood processing industries.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background to the Study

Business entities in today's competitive environment are constantly struggling with revolutionary trends in terms of accelerating product and technological changes, global competition, deregulation and demographic changes, and the apparent need to survive by implementing policies and programmes to cope with ever changing work place environment (Ganson, 2014). The workplace safety must not be the concern of only workers and industries but also national and international economies whose productivity and competitiveness play a major role on safe working environment.

In view of this, it must be recognized that everybody working in the industry has a duty to protect himself and others from accidents arising from various operations being performed (Oguntola, 1992). Each individual worker is liable to take precautionary measures to withstand any situation in the industry. Measures are the actions taken to achieve the objectives of any organizational set up. Actions can be taken to ensure the planning of wood processing activities such as sawing, mortsing, sanding, and design of any kind in the industry are carried out without any injuries that has the potential of incapacitating the worker, the environment or damage to property.

Wood processing industries are associated with the use of wood, equipment and different occupational hazards in the industries. Occupational hazards refer to working conditions of a job that are risky; and can lead to illness or death (Woodbury, 1997). The risky working conditions refer to the conditions that are affecting workers in the work place which cover such matters as health, safety and work activities. The operations of wood processing industries are generally associated with high level of occupational hazards with consequent health risk among workers (Addai, 2002). Hazards in various wood processing industries

which may lead to unsafe working conditions include dust, noise, electric shock, chemicals and vibration which may be encountered in working with pneumatic tools such as drills and hammers. Accidents in wood processing industries occur under working conditions such as poor factory layout, inadequate wiring, poor connections, over loaded circuits, lack of proper fuse protection, bad housekeeping, very often untidy floor areas and gang ways are unmarked .The tools and materials are poorly stored among swarf, used oil wiper rags are left in piles creating a fire risk, bench tops may be fully laden with equipment by jumbling together haphazardly, lighting is well below standard and lacking maintenance and the non-use of safety equipment.

The need to prevent occupational hazards leading to occupational injuries has been of growing interest and a great challenge to the government of Ghana and industries in the wood processing sector (Mutetwa 2005). Unfortunately, Ghana little research has focused on the field of occupational health especially relating to occupational hazards (WHO 2005). The national social security agency NSSA (2009) in Zimbabwe indicated that an annual occupational mortality rate of 1 249 per 100 000 workers was witnessed in Zimbabwe in the past decade. In Zimbabwe wood and wood products are ranked among the major accident. The Timber Producers Federation of Zimbabwe is using various methods to reduce occupational hazards in the wood sector, but with limited success (NSSA 2007). Parastatals such as NSSA are assisting in the management of occupational hazards in the wood industry by assisting with inspections, laws and regulations.

This enhancement could lead to industrial development. The recent developments in the wood processing sector are a response to a mixture of emerging constraints and opportunities that have existed for a much longer time ((Medium Density Fibreboard, 2008). All activities that involve the use of wood contain various hazards, which need effective management.

Traumatic occupational accidents and diseases in the sector represent a significant public health concern. Work related accidents induce enormous emotional and financial costs to families and to society. Unfortunately, work related accidents and diseases continue to be serious in the world. The human and economic cost of occupational accidents and diseases remain high and call for concerted efforts to handle them (Abongomera 2008).

**1.2 Statement of the Problem**

To improve health and safety measures at the workplace with the aim of ensuring continuous labour productivity, every business entity needs to put in place pragmatic health and safety practices that will address industrial accidents resulting in injury and death of workers (Ganson, 2014).

Research on occupational exposures in the wood industry and related industries has suggested that workers in sawmills, lumber mills, plywood and particle board factories, and veneer plants are at high risk of developing lower and upper respiratory track diseases , allergenic disorders and cancer (Amedofu, 2002).

Wood processing industries are the organizational set up that make use of forest products to produce various categories of wood products such as chairs, and paper for human consumption. Wood industries could be considered to be one of the most dangerous manufacturing industries for workers because they deal with sophisticated machines. With the use of machines for various wood processing activities, some operations are very hazardous which could lead workers to loss of fingers, legs and sometimes to death of operators.

Workers in wood processing industries such as sawmills are at the risk of developing cancer and lung diseases due to their exposure to wood dust and other substances during wood processing activities. The workers could also contract diseases through occupational exposure to wood dust and other substances connected with wood processing. Workers exposure to

toxic chemicals or harmful levels of noise or radiation may happen in conjunction with routine work as well as by accident in wood processing industries.

Exposure to unseen hazards make itself-felt only after a number of years – often to the surprise of the victim. It is noted that not all the dangers that occur in wood processing industries can cause harm; the effect may not be immediate. Managers of wood based industries such as sawmills need to care about the hazardous working conditions, health and safety of their workers. Despite the importance of safety placed on all the operations in the industries, various categories of hazards still occur during wood processing activities.

Conventional Occupational Health and Safety institutions have been designed to protect formal workers in formal work environments such as mines, factories, offices and shops, and so have no bearing on the working conditions of those who work in more unconventional settings. Part of the reason for this is that these institutions often take on narrowly focused, inflexible forms that are based on industrialized country models (Nuwayhid, 2004; Lund and Marriot, 2005). As a result, they bear little meaningful relation to the "complex, category-crossing" processes that characterize work in most African countries especially Ghana.

Much as Ghana has no national policy on occupational health and safety, many organisations operating in the country have their codes and regulations enforcing safety at work. This notwithstanding, the reports of many studies indicate that wood processing workers suffer many and varied hazards. Even though many apparent improvements have been achieved over the past few decades on occupational health and safety in Ghana, the focus has been on the formal sector neglecting the informal sector which actually employs greater percentage of Ghana's population (Kwankye, 2012). This study therefore seeks to assess the safety practices at Sokoban wood village in the Ashanti Region of Ghana.

### 1.3 Purpose of the Study

The purpose of the study is to assess occupational health and safety practices of wood workers at Sokoban wood village at the Ashanti Region of Ghana.

### 1.4 Research Objectives

Specifically this study seeks to:

1. Assess the awareness of occupational health and safety by wood workers at sokoban wood village.
2. Assess safety practices of wood workers at the wood village.
3. Determine if wood workers are provided with safety clothing's and equipment.
4. Audit safety gargets on wood work machines at Sokoban wood village.

### 1.5 Research Questions

The following are the research questions for the study:

1. To what extent are aware of occupational health and safety practices?
2. How do wood workers at the Sokoban wood village rate their practice of safety
3. To what extent are wood workers at Sokoban wood village provided with occupational health and safety clothing's and equipment?
4. Does wood work machines at the wood village have safety gargets?

### 1.6 Significance of the Study

The desire to achieve safety and health practices at work places have compelled many companies to adopt effective and efficient health and safety practices that is capable of addressing and minimizing industrial accidents that will result in injuries and deaths of workers. This desire should therefore stimulate research interest on effective ways in which efficient health and safety practices promote employees wellbeing. However, contributions to the ongoing debate, on the effectiveness of health and safety practices have attracted only very little attention from these practitioners and academia alike. As noted by researchers

(Noel, 2010), studies of health and safety practices have been dominated by studies of large companies in developed countries. The study is meant to provide an insight into how health and safety practices can be improved by wood industries especially in Ghana. This is because the information gathered and analyzed was a Ghana based industry.

Also the findings were based on well-developed questionnaire to furnish organizations that are in work place health and safety advocacy such as ministry of trade, NGOs and other related agencies to educate and sensitize workers. The information would also advance the course of workers welfare. Knowledge gain on health and safety practices would minimize workers exposures to such hazards. It will also lead to reduction in environmental contamination by the wood industries in general.

The findings of the study would also add to the already existing literature in the field of occupational health and safety practices especially in the informal sector. The management of the Sokoban Wood Village would find the findings of the study particularly relevant in coming out with concrete health and safety practices for improved safety and health of workers in the industry. The reason been that, the information retrieved pertains to the industries in terms of employees' level of awareness of their health and safety policies, their attitude and behavior towards such policies. It may also provide some useful information for machine operators on the use of Industrial equipment in organization of wood processing industries in order to eliminate hazards. Finally, the findings of this study may also help the workers to comply with the industrial standards related to wood working regulations.

### 1.7 Limitations of the Study

The study encountered a number of challenges. Key among them is the issue of funding. Activities such as transportation, printing of questionnaires, pretesting of questionnaires and other relevant documents proved financially burdensome. Another limitation is the relatively short period (five months) within which the research is to be carried out. As a student who is also a full time worker, the researcher is constrained with time and this is quite challenging.

The researcher is not oblivious of and is not overwhelmed by these challenges and took steps to as much as possible to minimize the effects of these challenges on the study.

### 1.8 Delimitation

The challenges facing sawmill industries in Ghana on standard safety practices is a nationwide issue, the focus of this research is limited to Kumasi Sokoban wood village alone, on the assumption that it is the area where sawmills are more concentrated.

### 1.9 Organization of the Study

The study had been organized into five (5) chapters. Chapter one which is General Introduction presents the background of the study, problem statement, research objectives, research questions, limitations delimitation and organization of the study. Chapter Two is a presentation of the relevant literature on the subject that is reviewed. It looks at concepts and theories as they relate to the research topic and research questions. Chapter Three discusses the research methodology that is adopted. It outlines the research design, data collection techniques, sources of secondary data, the research instruments used and sampling technique. The target population, analytical and presentation tools that is used are also explained. Chapter Four is a detailed account of the findings and results of the study. It discusses the researcher's analysis of the responses to the issues that is investigated. Chapter Five, the final chapter is a presentation of the conclusions that is drawn from the findings and recommendations to enhance Occupational Health and Safety within Ghanaian sawmill companies.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction

This section of the study consists of a review of existing literature on the topic. A brief history of the concept of occupational health and safety was traced. Policy documents on occupational health and safety were examined. The role of labour institutions, work organisations, governments and employees in ensuring the awareness and enforcement of occupational health and safety policies and practices were also evaluated. Finally, empirical studies conducted on the topic by earlier researchers in Ghana and beyond were equally reviewed.

## 2.2 The Concept of Occupational Health and Safety

Occupational health and safety has been defined in various ways by different researchers. World Health Organisation (WHO) in 1995 defined occupational health to includes the actions for occupational medicine, occupational hygiene, occupational psychology, safety, physiotherapy, ergonomics, rehabilitation, etc. Safety on the other hand refers to the protection of people from physical injury. The International Occupational Hygiene Association (IOHA) generally defines occupational health and safety (OHS) as the science of anticipation, recognition, evaluation and control of hazards arising in or from the workplace that could impair the health and well-being of workers, taking into account the possible impact on the surrounding communities and the general environment (ILO, 2009). This implies that occupational health and safety can be seen to concern the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations (ILO/WHO, 1995).

Abddllah, Spickett, Rumchev, and Dhaliwal (2009) as cited by Mark and Mitchual(2015) described occupational health as a sound state of the body and mind of people from illness resulting from the materials, processes or procedures used in the workplace, whiles occupational safety is the protection of people from physical injury. In the sights of Mathis and Jackson (2004), occupational health refers to a general state of physical, mental, and emotional well-being of a worker. The above definitions of occupational health presupposes the above authors share the same view that a healthy worker is the one who is free from illness, injury, mental and emotional problems that may impair his normal work activity or routine.

Premier Occupational Healthcare (2010) sees occupational health and safety as activities, processes, or procedural strategies to protect and promote the health and safety of workers. Thus, occupational health and safety at any workplace seeks to eliminate all factors, behaviours and conditions hazardous to human health and safety at work. OHS enhances the physical, mental and social well-being of workers, and supports the development and maintenance of their working capacity, as well as professionalism and social development at work.

Hall and Goodale (2007) see Health and Safety as 'conditions and factors that affect, or could affect the health and safety of employees or other workers (including temporary, and contract workers), visitors, or any other person in the workplace'. Dorland (2001) stressed 'health' as a state of optimal physical, mental and social well-being and not merely the absence of disease and infirmity. Occupational health and safety as contained in Encyclopaedia (1998) made it clear that 'job safety' as the interrelationship between people and work, material, equipment and machinery, environmental and economic consideration such as productivity. These terms 'health and safety' are considered together in the occupational context. Lucas

(2007) views the workplace as a physical location in which work related activities are performed under the control of the organisation.

According to Hughes et al, (2008) health and safety consider the working environment in a company and it comprises all factors that impact the safety, health, and well-being of employees. It includes environmental hazards, unsafe working conditions or processes, accidents, drug and alcohol abuse, and workplace violence. The researchers therefore define health and safety at workplace to include: the one where employers and employees group up to use a constant improvement process to protect and promote the health, safety and well-being of workers. This can be achieved by considering the following prerequisites: health and safety concerns in the physical work environment; health, safety and well-being concerns in the psychosocial work environment including organisation of work and workplace culture; personal health resources in the workplace; and ways of participating in the community to improve the health of workers, their families and other members of the community.

### 2.3 The History of Occupational Health and Safety Policy

The study of occupational safety and health has been in existence for as long as there have been structured work environments. Hippocrates (460-377 BC), for example, wrote of the harmful effects of an unhealthy workplace on slaves, and Caesar (100–40 BC) was reported to have an officer in charge of the safety of his legions (Pease, 1985; Weaver, 1980). This section traces the history of the various interventions developed to improve workplace safety. In the midst of the middle Ages, George Bauer (1492-1555) wrote several books on mining/metallurgy describing several innovative approaches for improving ventilation for workers in mining shafts (Raouf & Dhillon, 1994). And Bernadino Ramazzini (1633-1714), the father of occupational safety and health, also wrote on the safety aspects of mining as well as glass working, painting, grinding, and weaving. In *De Morbis Artificum,* or the

*Disease of Workers*, Ramazzini (1713) was the first to document the deleterious effects of working conditions on employees‟ health and studied the injury and death rates of many different occupations. Appreciative of the social importance of the progress and economic development of these occupations, Ramazzini discussed and suggested several preventive strategies for reducing occupational disease and injury (Pease, 1985; Pheasant, 1991; Raouf & Dhillon, 1994; Tayyari & Smith, 1997). Although these early safety *engineers* did not focus their energies on implementing intervention strategies in the workplace, they certainly laid the foundation for current approaches to reduce occupational illness and injury. As the *machine age* dawned with James Watt and Eli Whitney during the late 1700s, employers accepted industrial injuries and deaths as part of the working conditions without considering the economic ramifications. Employees were seen as volunteers, and were plentiful and replaceable (Leigh, 1998). Although the conditions in the early factories were horrendous, with two thirds of the employees being women and children working 12-hour days, people would risk disease, dismemberment and death for employment and a method for providing food for their families. Even if an employee suffered an illness or injury, they would seldom report the sickness because serious or frequent illnesses were cause for dismissal (Heinrich, 1959; Weindling, 1985). The history of occupational safety and health is vast and diverse, and therefore a comprehensive review is beyond the scope of this study. Therefore, this section of the literature review will focus on the major influences (i.e., government, insurance, engineering and psychology) and pertinent legislation that have shaped occupational safety and health intervention research.

## 2.4 Governmental Influence

As industrial centers grew, the degradation of living conditions increased and the death rate grew. For instance, in England, the first attempt of governmental intervention (1933) began with federally run factory inspections.

The Great Factory Act of 1844 improved England's factory conditions somewhat, but employers still saw no economic impact of an unhealthy or a risky workplace. Actually, the families of employees who died on the job had little legal recourse. Mostly, they had their funeral expenses covered by the employer (Heinrich, et al, 1980).

In 1880, England passed the Employers" Liability Act that made it possible for employees, or their families, to sue an employer for damages. This act made the employers more conscious of the costs of not addressing the safety of their working conditions. However, families still had the difficult task of proving employees (or a fellow employee) was not the cause of his own death, was not aware of the hazard, or that the employer was careless.

Factory inspections and the current laws increased employers" awareness of occupational safety, but it was not until the worker compensation laws were passed that industry owners finally began to realize the costs associated with occupation injuries.

Worker compensation laws proofed employee injury regardless of fault; but employees could no longer sue their employers under common law (third party lawsuits were still legal). "Apparently, the worker compensation laws were passed to protect employees. However, they were actually passed to control the number of large lawsuits against employers, and thus enabling a "predictable cost of doing business" (Leigh, 1998).

Hence, hitherto, the most effective interventions for improving occupational safety and health appeared to be implementation of top-down governmental regulations. As Heinrich et al. (1980) point out, "Legislation is one process by which government affects safety. Judicial process is another. Together, they change the impetus for safety or create a new impetus, and

the impetus is defined as time, money and effort" (Heinrich et al. 1980). Thus, regulations finally made it cost effective for employers to attend to working conditions that adversely affect employees‟ health and safety, though they were not always in the best interest of the employee (Heinrich, 1959; Heinrich, et al., 1980; Petersen, 1989; Weindling, 1985; Wilson, 1985).

### 2.5 Insurance Companies: The First Safety Consultants

As the worker compensation laws created a need for industries to invest in additional insurance, insurance companies needed to assess their clients‟ risks to assign proper rates (Kwankye, 2012). Thus, in the early 1900s, insurance companies created inspection departments. The inspectors would visit their policy holders to assess workplace hazards and assign the proper rate (i.e., underwriting). As these insurance inspectors gained valuable experience in looking for hazards in various industries, these safety consultants became the major impetus in organizational safety and health (Kwankye, 2012). During an inspection, for instance, if the insurance representative found a hazardous situation, he would make suggestions on how the organization could remedy the safety hazard and obtain a lower premium (also to control the insurance companies‟ losses).

The insurance companies were serving the employer while at the same time trying to control their own losses. Subsequently, the only safety concerns addressed by the insurance inspectors were ones currently covered by Worker Compensation laws of England. Furthermore, once the insurance agent assigns coverage rates, there were several self-serving mechanisms to motivate employers to improve the safety of their workplace. Merit rating schemes (i.e., scheduled rating), for example, rewarded loss control and penalized high worker compensation claims. The scheduled rating system may have motivated many companies to cover-upon not report certain claims to insurance companies in order to avoid a

penalty or keep their current coverage rate (Geller, 1996; Miller, 1997). Whereas it seemed the early insurance companies were striving for a safer workplace, they were instead trying to control their own loss and motivate employers to address only hazards covered by Worker Compensation (Heinrich, et al., 1980). In fact, most of the insurance inspector's time and safety materials went to the larger companies who paid massive premiums, leaving out the mid-sized to smaller organizations like wood processing companies. Insurance companies did develop safety guidelines and training materials that made an impact on health and safety. Nevertheless these interventions were guided by current governmental regulations and the need to control loss and not for the safety of employees.

### 2.6 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 fulfill 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

**2.7 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.

### 2.8 Environmental Protection Agency Act

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 organizations whose activities emit substances that are harmful. It also issues notices in the 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 GH ¢500.00 or to imprisonment not exceeding six months or both.

### 2.9 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.

### 2.10 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 of employment.
- Where an attending medical officer assesses 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.

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.

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## 2.11 The Concept of Employee 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 spillover 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.

### 2.12 Education/Training

A common method (or reflexive action) to encourage safe work-related behavior is for organizations to create or purchase an education and/or training program (Jewell, 1998; McAfee & Winn, 1989). In one study, the majority of organizations (96%) responding indicated that they offered safety training, while another questionnaire found that 46% provided some form of safety training as part of their regular occupational safety efforts (Lee, 1987; McAfee & Winn, 1989). Furthermore, a 1996 survey of over 1200 readers of *Industrial Safety and Hygiene News* revealed industrial education and training in safety to be a top priority for 1997 (Johnson, 1996).

Educational safety programs focus on increasing peoples' knowledge by giving them a background on theories, principles and techniques for improving their future problem-solving abilities. In the *Psychology of Safety*, Geller (1996) stresses the need for safety-related processes to begin with theory and build from solid psychological principles. Geller (1996) also emphasizes the importance of training. Training compliments education by providing employees opportunities to apply the knowledge provided by the education (Pettinger, 2012). Thus, the purpose of an education/training procedure "is to provide an environment for the

acquisition of attitudes, knowledge or skills, so that newly acquired behaviors may be transferred to the job setting" (Goldstein, 1975). A successful education/training program can impact workers' safety by giving them the tools and knowledge to use when faced with a novel emergency on or off the job.

Viscusi (1983) hypothesizes an alternate motivation for occupational safety and health education/training. In his book, *Risk by Choice,* Viscusi (1983) examines the motivation behind adopting various types of education/training programs and criticizes the content of such programs. Although employers never provide prospective employees the average annual death risk or chance of acquiring an injury, when workers begin a job they have some general idea of the risks they face. However, once they gain experience on the job, their risk perception changes (Pettinger, 2012).

From a sample of 6,000 employees, Viscusi (1983) found that when workers' risk perceptions increase, their propensity to quit also increases by 35%. Since hiring new employees is costly (due to retraining and loss of experience), the content of education/training programs "is not intended to enable workers to assess the risk more accurately…it is directed at lowering workers' assessment of the risk" (Viscusi, 1983). Consequently, the information given to employees in education/training sessions reduces the perceived risk of their job and avoids costly turnover.

Furthermore, results of education/training efforts have been inconclusive, since intervention research seldom solely relies on education/training alone. (Petersen, 1996; Hale &Glendon, 1987).Petersen (1996) states that "safety training historically has involved more preachments than real teaching of skills to achieve results" (p. 12). However, Fiedler, Bell, Chemers, and Patrick (1984) found significant improvement in lost-time injuries and number of Mining Safety and Health Administration (MSHA) citations received following a management education/training safety program. Moreover, Zohar (1980) surveyed 20 industries (four from

metal fabrication, food processing, chemical, and textile) and found that perceived safety importance was significantly related to the organizational safety climate (i.e., workers' perceptions of structure, system, goal direction, and management leadership style).

Although widespread, education/training programs are rarely systematically evaluated in any type of industrial application (Goldstein, 1975; McAfee & Winn, 1989; Vojtecky& Schmitz, 1986). Evaluative research in occupational safety is seldom initiated because of methodological and design constraints that prohibit many types of teaching methods from being evaluated (U.S. Department of Health and Human Services and Public Health Services, 1990). For instance, in a survey given to individuals involved in the evaluation of safety and health programs (n = 124), 40% of these safety professionals were dissatisfied with their attempts to demonstrate the beneficial impact of their safety education/training (Vojtecky & Schmitz, 1986).

Due to inconclusive findings, occupational safety research needs to address the "longer-term benefit of educational/training programs and how these approaches can be combined with others to accelerate behavior change" (Institute of Medicine, 1988, p. 11).

Finally, if education and training methodologies are combined (Geller, 1996), implemented in good faith (Viscusi, 1983), and evaluated systematically to assess the transfer of knowledge (Goldstein, 1975), education/training programs have great potential to make a difference in the safety and health of many employees.

### 2.13 Enforcement

The final E in *the three Es of safety* is enforcement. There are two types of enforcement in occupational safety and health: enforcement within the industry (referred to as *discipline*) and enforcement by governmental agencies (referred to as *compliance*) (Pettinger, 2012). Within industry, the company imposes safety rules or policy and procedures as guidelines for

employees to follow. When employees do not follow these guidelines, there is a possibility of disciplinary action (e.g., verbal warning, written warning, time off work, job termination). Governmental agencies establish laws or regulations for organizations to follow. When employers do not comply, they receive citations with accompanying fines (Pettinger, 2012). For occupational safety and health, it is very common for employees and employers to be held accountable for their actions (Geller, 1998). There is considerable debate, however, regarding the effectiveness of discipline and compliance as a motivating intervention for safe behavior (Hale & Glendon, 1987; Geller, 1998b, 1996; Petersen, 1996; Wilson, 1985).

### 2.14 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" whiles 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).

### 2.15Health Hazards in the Wood Industry

The World Health Organization (WHO) report 2000 notes that, occupational health risks are one of the leading causes of morbidity and mortality in the world in general and developing countries in particular. In India alone, research reports estimated an annual incidence of occupational disease between 924,700 and 1,902,300 cases and 121,000 deaths (Leigh et al, 1999). Numerous studies on many industries including the leather tanning industry, textiles and metal ware have found that workers in these industries work in inhuman physical conditions for very long hours (Usha, 1984; Labour Bureau Reports 2000; 1998; 1996; 1992b; 1992a; Banerjee and Nihila, 1999; Nihila 2002). A survey by Adei and Kunfaa (2005) revealed, that employees in the wood processing industry were exposed to physical, ergonomic, mechanical and chemical hazards.

The perceived physical hazards in the study were sawdust, noise and extreme hot temperature. Sawdust was a major hazard in all the Wood Processing companies surveyed which is consistent with the work place health and safety hazards survey by the MOH (1998), that showed that wood dust and shavings were major hazards among woodworkers. The percentage of workers as the study maintains who were provided with nose masks and those who claimed to use it may be an over estimation. Apart from one small company surveyed, where all workers were seen wearing their nose masks, some workers in the rest of the companies surveyed had their nose masks on their foreheads because they found them uncomfortable to use.

Amedofu (2002) as cited in Adei & Kunfaa (2005) observed that hearing impairment usually develops slowly over a long time and the impairment can reach the handicapping stage before

an individual becomes aware of what has happened. The researcher had to shout when administering the questionnaire to some of the workers at their administration block, which were insulated from noise. This suggests that majority of workers were not aware of their hearing impairment. It therefore appears that where earmuffs were provided their use was not clearly understood. Most supervisors and workers in the wood processing companies surveyed perceived noise as an inevitable part of the production process. The supervisors had no idea of the quantitative noise levels the workers were exposed to and only 6.5 percent knew that the maximum allowable noise limit for eight hour shift should not be more than the recommended levels by Environmental Protection Agency (EPA) in Ghana. Amedofo and Asamoah-Boateng (2003) showed that workers in sawmills, and corn mills were exposed to noise levels exceeding the recommended levels by Environmental Protection Agency (EPA) in Ghana. Workers at the boiler and kiln dryer sections in the large and medium sized companies perceived their work environment to be hot. Workers at the boiler sections experienced profuse sweating although no temperature-monitoring equipment was in place. The companies with clinics (three large and one medium-sized) processing companies) had a record, complaints of fatigue, discomfort and heat exhaustion as a result of the excessive heat exposure. Ezeonu (2004), reported heat exhaustion caused by exposure to high temperature among kiln workers in a Nigerian company.

### 2.16 Occupational Diseases and Accidents (Injuries)

Encyclopedia Britannica (2009) defines occupational disease as any illness associated with a particular occupation or industry. These diseases result from a variety of biological, chemical, physical, and psychological factors that are present in the work environment or are otherwise encountered in the course of employment. Occupational disease is concerned with the effect of all kinds of work on health and the effect of health on a worker's ability and efficiency.

Occupational diseases are essentially preventable and can be ascribed to faulty working conditions. The control of occupational health hazards decreases the incidence of work-related diseases and accidents and improves the health and morale of the work force, leading to decreased absenteeism and increased worker efficiency. In most cases the moral and economic benefits far outweigh the costs of eliminating occupational hazards (Encyclopedia Britannica, 2009).

According to Judd (2004), accidents and injuries in the wood working sector of Ghana are caused by exposure to occupational hazards. Hazards include any aspect of technology, or activity that poses risks. The level of risk is primarily the combination of two factors: the level of toxicity or amount of energy present and the degree of exposure (Judd, 2004). Health and safety in the wood working sector can only be pursued comprehensively, integrating all spheres of work, (Steen- Kamp 2002). The nature of work in wood processing industries, type of equipment and material handled present on the job all influence the nature of hazard (Judd, 2004). Traumatic occupational injuries in the timber sector represent significant public concern. Timber related accidents induce emotional and financial costs to both families and society. In 1998, Europe's wood and wood products industry suffered around 90 000 work accidents involving more than three days absent from work. In Italy, the timber processing industry rates as one of most hazardous occupations. Accidents and injuries are as a result of conveyor systems, rapid moving parts of machines blades, saws, falls and slips, kickbacks, wood handling, and vehicle accidents (Boy, 2002). Comlan*et al.* (2007) note that rotating devices, cutting or shearing blades, in running nip points and meshing gears are typical examples of potential sources of workplace injuries while crushed hands, severed fingers, amputations and partial blindness are typical wood working accidents. In Gabon's timber processing industry, in 2007 and 2008 data collected on work related accidents through the National Social Security Bureau indicated that the largest percentage of work related

accidents were in public utility industries (30.1%), timber processing (21.5%) and commerce (16.5%). Wood processing in Gabon is a dangerous occupation which involves more than 30% of the active population. In 2007-2008 accidents involving contact with objects and equipment exceeded all other events accounting for 64.1% of traumatic occupational accidents. Approximately a quarter (24.6%) of these occurred among the timber processing workers in Gabon. Further out of a total of 825 injuries the proportion linked to wood processing was 21.5%. In this group 24.2% of woodworkers were injured in 2007 and 19.3% in 2008. With regard to nature of work related injuries and disorders; open wounds 48.6% , traumatic injuries 29.9%, bone and spine injuries 17.5% and multiple traumatic injuries 7%. Hence the National Social Security Bureau programme gathers epidemiological information that helps to understand more about accidents linked to timber processing (Bello, 2010). For example: In Nigeria, According to Belloand Mijinyawa, (2010) ,in wood processing industries, a total of 140 injury cases were recorded among 64 workers. Results indicated that mill operators suffers highest rates of 83% while moving planks of wood into milling machines such as moulder machine, timber stacking accidents accounted for 36% while transport accidents is 22%. Furthermore injuries occurring to body parts include upper limb 68%, back and lower injuries 58% and less prominent lower injuries at 13%. In the case of Nigeria wood processing industries, a major risk factor noticeable in the factory was age factor of machines and equipment in use. Most of the machines were obsolete with most of the safety guards removed and non-functional. It was also noted that from the study, the respondents notion about the concept of health and safety rules for operations in timber processing do not give preference to basic safety training in hazardous operations. None of the workers had attended safety training in the previous years. In most cases most of the workers entered the timber industry not as trained wood industry workers with a requisite

professional knowledge. This had exposed most of the workers to some untold level of hazards (Bello, 2010).

### 2.17 Prevailing Work Environment at the Sawmill

According to ByarsandRue (2008), the work Environment comprises a set of conditions in which a worker discharges his responsibility. It may be safe or unsafe depending on factors such as ventilation, illumination, noise levels, toxicity levels, dust, the nature of work whether repetitive or shift work, pushing, pulling physical workload are important work environment factors considered. Other work environment factors are handling, training (formal training and on-the job training), works' characteristics (age scale level, knowledge, experience). Plant/floor lay-out (flow of work, flow or traffic), ergonomics, types of machines, training received by workers, maintenance culture are among factors that constitute a work environment (Burkel, 2006; Holcroft & Punnett, 2009). By adjusting your work environment, you may be able to minimize fatigue and discomfort, and reduce the risk of resulting stains that some scientists believed can lead to injury (Schutte, 2011). Studies have shown that industrial accidents are closely linked to the prevailing work environment and tasks carried out (Biron*et al*, 2006).This risk posed by each of these factors may vary from factory to factory (Burke,2006;Holcroft&Punnett, 2009). Other forms of health hazards that manifest in the industry could be attributed to the level of infrastructure in the wood processing firms. These include ventilation, illumination, toxic levels, and presence of dust, temperatures, housekeeping, ergonomics and machine maintenance.

### 2.18 Ventilation

According to Litwin (1968) Poor workplace ventilation is a hazard that affects the health of sawmills workers. Cost-cutting measures and employer inaction hamper the fight for proper

ventilated workplaces. Poor ventilation often results from cutbacks, overcrowding of workplaces and employer control and misuse of ventilation systems. The shortage of workspace means there are more workers in less space, and members are not getting adequate amounts of fresh air. Employer control can result in ventilation systems that are misused and set to run at substandard levels (Andersson & Menckel, 1995).

### 2.18.1 Illumination

Is a condition which makes visibility difficult at the workplace and facilitate hazard as workers cannot see with precision, thereby making mistakes which may result in fatalities such as machine injuries and long term visual problems. Adequate provision should be made for natural light in addition to artificial lighting system to avoid hazards (Litwin, 1968).

Illumination: is extremely important to the health and safety of everyone using the workplace. The quicker and easier it is to see a hazard, the more easily it can be avoided. Poor lighting can affect the health of people at work: two relatively common illnesses are Sick Building Syndrome (SBS) and Seasonal Affective Disorder (SAD). Symptoms of SBS include headaches, lethargy, irritability and poor concentration. SAD symptoms include difficulty waking up in the morning, morning sickness, over sleeping, over eating (particularly carbohydrates to comfort eat), lack of energy and concentration, and withdrawal from social activities. This can lead to depression. The employer is responsible for the lighting in the workplace and should be aware of the costs of poor lighting. Poor lighting can be costly to businesses in the case of increase accidents and injuries; increased absenteeism; reduced staff efficiency and productivity (Health and Safety Executives, 1997). According to Health and safety at workplace Act 1974(HSWA), it is the duty of employers to ensure the health and safety of employees and others who may be affected by their work activities (Litwin, 1968).

### 2.18.2 Toxicity levels

Air toxics are a diverse range of air pollutes that are usually present in ambient air in relatively low concentrations but have characteristics as persistence that make them a hazard to human, plant or animal health. These pollutants include volatile and semi-volatile organic compounds, heavy metals and others. Air toxics are sometime referred to as "hazardous air pollutants: carbon monoxide, lead nitrogen dioxide, ozone, particles and Sulphur dioxide (Australian Department of the Environment and Heritage, 2005). Air emissions from sawmill operation are generated from a number of sources. Combustion products emitted by boilers may include carbon monoxide (CO), nitrogen oxides (NOX), sulphurs oxides (Sox) particulate matter (PM), and volatile organic compounds (VOCs) from bark and wood depending upon fuel selection. VOCs may also be emitted during kiln drying of wood and application of solvents, Coating, and lacquers. Wood dust and larger particulates are generated during sawing, machine and sanding operations. Sawmill operations may use controlled incineration to dispose of wood waste, which may result in emissions of carbon monoxide(CO), nitrogen oxides(NOX),particular matter(PM) and volatile organic compounds(VOC) from bark and wood( Tzanakis*et al.*, 2001, ILO, 2012).

### 2.18.3 Dust

According to Litwin (1968), the presence of dust, a cloud of substance in the air, which is usually the residue of material, especially saw shavings and dust can cause eye and respiratory problem resulting in lung hazards. Wood dust is created when machines are used to cut or shape wood materials, industries that have a high risk of wood-dust exposure include sawmills, dimension mills furniture industries, cabinet makers, and carpenters. Native health effects have been associated with profession that shape, cut or work wood. Companies need to be aware of the health's effects of wood dust. Hardwoods such as oak, mahogany, beech

walnut, birch, elm, and ash have been reported to cause nasal cancer in wood-workers. This is particularly true when exposures are high. Dust collectors for individual machines are usually more expensive and required more maintenance. Temporarily closing dusts that service equipment not in operation increases. Air flow to the rest of the wood vacuum devices. Adding a stronger fan to the system may be another solution (Litwin, 1968).

### 2.18.4 Extreme temperature:

According to Lorsch, (1976), Consistent presence of extreme heat usually brought about by emission from plant engines may cause discomfort and result in long term hazards. According to Lorsch (1976), Segun, Bello and Yahaya (2010), other non-visible body effects such as changes in environmental and body temperature could increase blood pressure and pulse rate of workers as influenced by space heating due to engines. It is therefore important that adequate ventilation provisions are made, and heat extractors fixed on factory building to mitigate the effects (Lorsch, 1976).

### 2.18.5 Ergonomics

The science of ergonomics studies evaluates a full range of tasks including, but not limited to, lifting, holding, pushing, walking and reaching. Many ergonomic problems result from technological changes such as increased assembly line speeds, adding specialized tasks, and increased repetition; some problems arise from poorly designed job tasks. Any of those conditions can cause ergonomic hazards such as excessive vibration and noise, eye strain, repetitive motion, and heavy lifting problems. Improperly designed tools work areas can be ergonomic hazards. Repetitive motions or repeated shock over prolonged of time as jobs involving sorting and assembling can often cause irritation and inflammation of the tendon sheath of the hands and arms, a condition known as carpal tunnel syndrome. Ergonomic

hazards are avoided primarily by the effective design of a job or jobsite and better designed tools or equipment that meet worker' needs in term of physical environmental and job tasks. Some of these ergonomic engineering designs include adjustable – height stacking carts (scissors lifts), cushioning mats, sit – stand chairs, foot rails and foot gear with cushioning insoles (NIOSH, 1997, Tappin*et al*., 2003).

The relative hazards associated with employment in sawmills compared to other sectors of wood products manufacturing were highlighted in an analysis performed in New employed in sawmilling and planning operations, 50% of injury cases, came from this sector, of which more than half were musculoskeletal disorders (MSDs). The pulp/paper and plywood/veneer sectors had 10 and 8% of the injury cases, respectively, during the period 1994 through 1999 (Laurs, 2000). The job tasks that were most commonly cited as sources of MSD injuring included: pulling/sorting/stacking timber, grading lumber, tailing (off bearing), and saw filling. These jobs require repetitive twisting, puling, lifting and reaching (Tappin*et al*, 2003).

### 2.18.6 Housekeeping

Good housekeeping, whereby machines and the areas around them are kept clean and tidy, is one of the most essential requirements towards efficient machine performance and maintenance. Men or machines cannot work to their maximum efficiency if they are hampered by sawdust, waste and off-cuts from the logs or lumber being sawn. Apart from the lost production time which such conditions create, the possibility of accidents or machine breakdowns is greatly increased (FAO, 1990). Under factory acts legislation, in many countries, an untidy mill can be an offence against the regulations covering safety precautions prescribed for sawmills, and factory inspectors can take action accordingly. Saving money by inadequate labour or time to maintain a clean and tidy sawmill is false economy as

subsequent events will no doubt prove (FAO, 1990). A factor which is rarely taken into consideration is the effect of good housekeeping on the moral of all sawmills staff. Working in a sawmill which is maintained in a clean and tidy condition is much more pleasant than having to work on machines surround by waste off – cuts and lumber waiting to be removed. Statistics show that the majority of falls are on the same floor level, and are the result of slipping or tripping over something on the walking surface which in the case of the sawmill industry may be caused by off – cuts, oil, banana peels etc. slips trips falls account for nearly 25 percent of all workers' compensation claims (Micheal & Weidenbeck, 2004).

**Housekeeping** hence cannot be sidelined in the saw mill industry for a myriad of reasons some of which are that:

a. Machines are less likely to suffer damage or overheat caused by a build – up of waste materials.
b. The safety factor to personnel is increased
c. Personnel morale and performance is increased.

### 2.18.7 Plant layout/traffic

Laying out a factory involves deciding where to put all the facilities, machine, equipment and staff in the manufacturing operation. Layout determines the way in which materials and other inputs (like people and information) flow through the operation. Relatively small changes in the position of a machine in a factory can affect the flow of materials considerably (Allington, 2006).

A good layout also has significant effect on the safety of the workers and non-workers within at sawmill. When some serious accidents happen, such as explosion, fire, toxic substance' leakage, not only people and facilities in the accident unit are in danger, but also people and facilities in adjacent units. A good design therefore would decrease the adjacent units' losses

caused by accidents of one special unit, e.g. there should be clear boundary between production areas and living area: units with high population density or high property density cannot be set near the unit with high fire and explosion risk.

In the case of accidents, rapid and effective rescue can decrease the losses markedly. But a bad layout may baffle the rescue e.g. fire passage is too narrow; the unit with high risk is set in the position where rescuer cannot reach rapidly; pipeline with toxic substance is laid in the narrow line way where is discommodious for people to repair the pipeline or plug up the leakage point. When fire, toxic substance leakage or other comparatively mild accidents happen, people in the accident unit usually have chances to get away from dangerous area and survive. But a bad layout may decrease the success rate of people's saving themselves, e.g the passage around the unit is narrow, circuitous or even impassable; main escape passage passes the unit with high risk (Meng-YiFei & Zheng, 2010).

**Training:** Safety training is a key element in the prevention of work – related injuries, illnesses and death. When educated on safety procedures, employees will know how to present an incident in the workplace by properly operating machinery, and will also learn how to respond quickly if presented with a dangerous situation. A myriad of safety training course topics are important for sawmill operators. For example, eye safety and Lyme disease training is pertinent to construction and other outdoor workers, while first training is important for all work environments. Other types of safety training courses include workplace violence, respiratory disease screening and electrical current safety, to name a few. Safety training is deliverable in several ways, including, via live instructor-led classroom sessions, videocassettes or DVDs, online courses and webinars (OSHA, 1998).

There are several benefits of safety training organizations in sawmills. Some of these are: Educating employees on the safety rules of the work environment can give the sense of safety and security while performing daily tasks, which can lead to increased productivity. Another

benefit of safety training is a reduction in accident and incident rates, which reflects favourably on an organization. Safety training is also important because it provides a way for companies to document proof that such training has occurred, protecting it from potential lawsuits involving injuries.

Companies are legally responsible for providing the safety skills mandated for their industry by OSHA. Maintaining records that detail courses completion rates and certification status of employees is crucial because it helps pinpoint the safety training that still needs to be addressed. Documenting safety training progress also helps companies demonstrate compliance with laid down regulations, which go a long way in avoiding fines and noncompliance lawsuits. Continued safety training is important because it helps drive home the dangers of the workplace to all employees, including those who have become complacent performing. Employees undergo an initial training which is given to new employees in order to inculcate a safety culture into them. It emphasize the specific safety and health hazards, emergency operations including shutdown, and safe work practice applicable to the employee' job task.

Within specific time intervals, employees undergo Refresher training. Refresher training is recommended at least once every three years, and more often if necessary, to each employee involved in operating a process to assure that the employee understands and adheres to the current operating procedures of the process. The employer, in consultation with the employees involved in operating the process, is expected to determine the appropriate frequency of refresher training. It is important that such training sessions be properly documented (OSHA, 1998).

**First Aid:** The sawmill industry is one of most dangerous industries to work in, slips and unconsciousness has led to amputations, severed fingers among several injuries (Heinrich, 1959). It is therefore a requirement of OSHA that employees be given a safe and healthy

workplace that is reasonably free of occupational hazards. However, it is unrealistic to expect accidents not to happen. Therefore, employers are required to provide medical and first aid personnel and supplies commensurate with the hazards of the workplace (OSHA, 1998). In order to determine the content of first aid kits, sawmills should consult federal, state and local requirements regarding the types and quantities of material to be included (Geller, 1996).

Employers who have unique or changing first-aid needs in their workplace may need to enhance their first-aid kits. Consultant from the local fire/rescue department, appropriate medical professional or local emergency room may be helpful to employers in these circumstances (Clarke, 2004).

### 2.19 Occupational Health and Safety in Ghana

Employers in Ghana are required by the Ghana Labour Act 2003, Act 651 to ensure their employees are not exposed to conditions that would lead them to work related injuries or illnesses (Kwankye, 2012). Employees are also required to exhibit their duty of care in ensuring that they work as per the employers'' standard operating procedures which must incorporate safety and health requirements.

Ghana has different agencies under different jurisdictions which monitor different industries for workplace and employee safety; however, there is no national body, policy nor process that govern Occupational Safety and Health management in Ghana. Firstly, there is a Road Safety Commission but with little standards, guidelines and impact on the safety of the transport industry and the pedestrian (Kwankye, 2012). The Minerals Commission has the Mining Regulations 1970, which contains some guidelines in Occupational Safety and Health but just for the Mining Industry (Kwankye, 2012). Currently, there exist a draft of the reviewed Mining and Minerals Regulations which is pending approval by the Parliament of Ghana. Numerous injuries, illnesses, property damages and process losses take place at

different workplaces but due to under reporting or misclassification due to lack or thorough standards, or unfamiliarity with the existing guidelines, people are not normally in the known of such events as well as their actual or potential consequences and effective corrective actions required (Annan,2010).

Currently, there are major ethics that have provided guidance in the provision of occupational / industrial safety and health services, practice and management in Ghana.

These include the Factories, Offices and Shops Act 1970, Act 328 and the Mining Regulations 1970 LI 665; however these acts and regulations have only driven the mining and the labour sectors and are therefore very limited in scope, given the multifaceted distribution of industrial operations that we have in Ghana. There is the Workmen's Compensation Law 1987 (PNDC 187) which relates to compensation for personal injuries caused by accidents at work and hence, indirectly impacts on monitoring workers / workplace safety. The Radiation Protection Board of the Ghana Atomic Energy Commission is also proactive in monitoring companies with radiation exposure hazards for compliance, however, due to limited resources, effectiveness of their activities is compromised (Annan, 2010). There are other statutes which indirectly impact on Occupational Safety and Health and these include the Environmental Protection Agency Act 490 1994, the Ghana Health Service and Teaching Hospital Act 526, 1999 and the National Road Safety Commission Act 567, 1999 (Kwankye, 2012).

Though, Ghana is among the 183 member countries of ILO, which requires, as per the ILO convention number 155 1981, that member countries formulate, implement and periodically review a coherent policy on occupational safety and health and work environment, Ghana has not yet rectified this convention and the nation has no established authority dedicated to Occupational Safety and Health to guide and facilitate the implementation of the "Action at the National Level" as indicated in the R164 Occupational Safety and Health

Recommendation, 1981 (Kwankye, 2012). However, the Labour Act 2003, Act 651, Part XV, sections 118 to 120 apparently directs employers and employees in their roles and responsibilities in managing Occupational Health, Safety and Environment in the nation (Kwankye, 2012), but is not specific about whom to report accidents and occupational complaints to. The Labour Act 2003 is not clear or does not specify what to consider as Occupational Illness. Moreover, itdoes not specify who to be responsible for ensuring the industries in Ghana implement corrective actions as per recommendations. Currently, accidents that occur in factories are expected to be reported to the Department of Factory Inspectorate (DFI) but companies hardly report such events to the inspectorate for investigation and correction (Kwankye, 2012). When these accidents get reported, it takes a long time before corrective or preventive actions get implemented, hence, there is a little or no positive effect of the action of the DFI on the factories (Kwankye, 2012). The nation has seen some positive "Safety and Health practice infection" among some of our Ghanaian companies due to the influx of some multinational companies into the country, given their corporate expectations with specific requirements in Occupational Safety and Health practices. This stems from their requirements for the contractors, and subcontractors, some of whom are Ghanaian, to follow their Health and Safety standards as exhibited by companies or firms outside the country. Much as this is a good effort and helps the Ghanaian to know there is more to Occupational Safety and Health than we have specified in our legal framework, it tends to confuse the Ghanaian the more with regard to which standard to follow in the nation, and what is required to make employees and employers accountable. In academia, Occupational Health is not an option for specialization in a typical Ghanaian medical school. Safety engineering has not found its way into any of our Engineering curricula in Ghana yet (Kwankye, 2012). A potential intervention is the proposed Safety and Environmental Engineering program which is being expected to commence at the University

of Mines & Technology (Kwankye, 2012), but this is not approved yet. All other Safety &Health training programs are run either by international agencies or some few Ghanaian organizations but none of these matches up to even a first degree (Annan, 2010).

### 2.20 Health Hazards in the Wood Processing Industry

The World Health Organization (WHO) report 2000 notes that, occupational health risks are one of the leading causes of morbidity and mortality in the world in general and developing countries in particular (Kwankye, 2012). In India alone, study reports estimated an annual incidence of occupational disease between 924,700 and 1,902,300 cases and 121,000 deaths (Leigh et al, 1999). Amedofu (2002) as cited in Adei and Kunfaa (2005) observed that hearing impairment usually develops slowly over a long time and the impairment can reach the handicapping stage before an individual becomes aware of what has happened. The researcher at certain points had to shout when administering the questionnaire to some of the workers at their administration block, which were insulated from noise. This suggests that majority of workers were not aware supposed hearing impairment that emanated from their continuous exposure to noise from the milling machine. It therefore appears that where earmuffs were provided their use was not clearly understood. Most supervisors and workers in the wood processing companies surveyed perceived noise as an inevitable part of the production process and as such has become a normal day to day process that should happen in the workplace. The supervisors had no idea of the quantitative noise levels the workers were exposed to and only 6.5 percent knew that the maximum allowable noise limit for eight hour shift should not be more than the recommended levels by Environmental Protection Agency (EPA) in Ghana. Amedofo and Asamoah-Boateng (2003) showed that workers in sawmills, and corn mills were exposed to noise levels exceeding the recommended levels by Environmental Protection Agency (EPA) in Ghana. Workers at the boiler and kiln dryer

sections in the large and medium sized companies perceived their work environment to be hot. Workers at the boiler sections of most wood processing companies experienced profuse sweating although no temperature-monitoring equipment was in place (Kwankye, 2012). The companies with clinics (three large and one medium-sized) processing companies) had a record, complaints of fatigue, discomfort and heat exhaustion as a result of the excessive heat exposure but was not efficiently used. Ezeonu (2004) also reported of heat exhaustion caused by exposure to high temperature among kiln workers in a Nigerian company with similar situations being recorded in Ghana.

### 2.21 Health and Safety Practices

Records at the Environmental Protection Agency (Kumasi Office) revealed that two large and one medium-sized wood processing company out of fourteen companies had submitted occupational health and policies (OHS) in May 2004 as part of their Environmental Management Plan. The policy statement of these companies were not posted on the notice boards on their company premises neither could they be produced on request. The supervisors and other workers in the three companies with OHS policy were not aware of the existence of the policy. It is difficult to see how a company's OSH policy could be effectively operationalized with general lack of awareness. Matooane (1997) reported that in Lesotho, out of ten woodworking (four large and six small) industries in that country, only one small company had an OSH policy, indicating little commitment on the part of small companies. Personal Protective Equipment (PPE) was the main measure adopted to mitigate the effect of hazards in all the Wood Processing Industries. These were safety boots, overall coat, nose masks, ear protectors, goggles and gloves. Generally, apart from the PPE"s not being adequate and not properly used, there was lack of enforcement in their use. The supervisors on the factory floor did not also wear Personal Protective Equipment (Odhiambo, 2003).

There appeared to be low administrative and engineering controls in companies because it appeared most managers perceived injured worker's replacement an easy option, and that insurance cover for injury was a sufficient protection for their workers and companies. Consequently, they perceived occupational hazards in the work place to be normal with their operations and, therefore, lacked the commitment to ensure safe healthy practices (Odhiambo, 2003).

In Ghana, an extensive study conducted by Boateng (1997) reported that 67 percent of Food, Drink and Tobacco (FDT) firms in Ghana, had safety committees, with membership made up of representatives from all departments except one drinking firms whose members were selected on the recommendation of the Department of Factories Inspectorate. There were no visible posters on safety in all the companies surveyed and in most cases where they had posters given by the Department of Factories Inspectorate; they were in the drawers of the managers. News letters on health and safety were also non-existent. Consequently the workers and the employers do not derive the maximum benefit from risk assessment, which is a higher productivity and a healthier working environment and work force.

**2.22 Relevance of Occupational Health and Safety**

According to a published report in 2001 by the UK Health and Safety Commission (HSC) and the Health and Safety Executive (HSE), an increase in employee involvement with health and safety issues actually helped to reduce accident rates from 1.2 to 0.1 per 100,000 manhours.

It also revealed that when employees are evaluated for their safety performance, they are included to seek and implement practical safety improvement ideas. Occupational health and safety policy is not only needed within the timber industry but as said by Alli (2001), all government institutions should be committed to developing one in order to minimize

government expenditure on compensation paid to workers as a result of injuries and accidents at the workplace. This view of Alli (2001) is also shared by Lamm, Massey and Perry (2007) who are of the view that a clear occupational health and safety policy plays an important role in reducing accidents and injuries at work. A good practice of OHS management in an organization should demonstrate better task performance and citizenship behaviour which at the end of the day increases productivity.

The use of OHS management systems for every department in an organization can offer employees with a clear accepted code system of rules or procedures about the safe operation of machinery, various devices and appropriate behaviours. Looking at the effect on occupational health and safety policy on employees' performance, Lim (2012) in his literature added that when workers understand the health and safety rules and procedures of their job and the tools used for working, it helps them to work effectively and efficiently resulting in better performance of employees. Again the literature provided by the Australian National Commission for Health and Safety (2002) on the benefit of promoting health and safety in organizations indicated that when employees are provided with safe working environment through the use of effective occupational health and safety management systems, it reduces employees absenteeism and this has direct effect on increase in productivity which the end result will be increase in profitability for the organization. Looking at a report by Safe Work Victoria (2006) on health and safety of various organizations, they share similar view of the literature provided by Australian National Commission for Health and Safety. To them, in organizations where health and safety policies are highly promoted, employees feel valued because they are kept from danger at work. This provides opportunities for employees to perform very well on the job to achieve organizational success. Hudson (2012) also sees health and safety promotion at the workplace having direct positive impact on employees' performance. To the writer, good occupational

health and safety management practices would help to build a positive workplace culture and this enhance performance of all employees. To him, it also gives room for high employee performance that encourages creativity and innovation. A research provided by Ward et.al. (2008), support the many writers who see organizations enjoying direct benefit in promoting occupational health and safety. To them in an organization where employees within feel that management 'cares' for them, there is an indication of positive management of occupational health and safety system and as such results in safer working practices and also have positive impact on employee outcomes (example, job motivation, job involvement, safety climate, organizational commitment, job satisfaction, mental health and wellbeing). Positive or greater records of these outcomes support the ability of the employee to perform very well on the job for the organization to achieve its goals. From the literature of the various writers on the effect of occupational health and safety, one can develop a conceptual model for the study as:

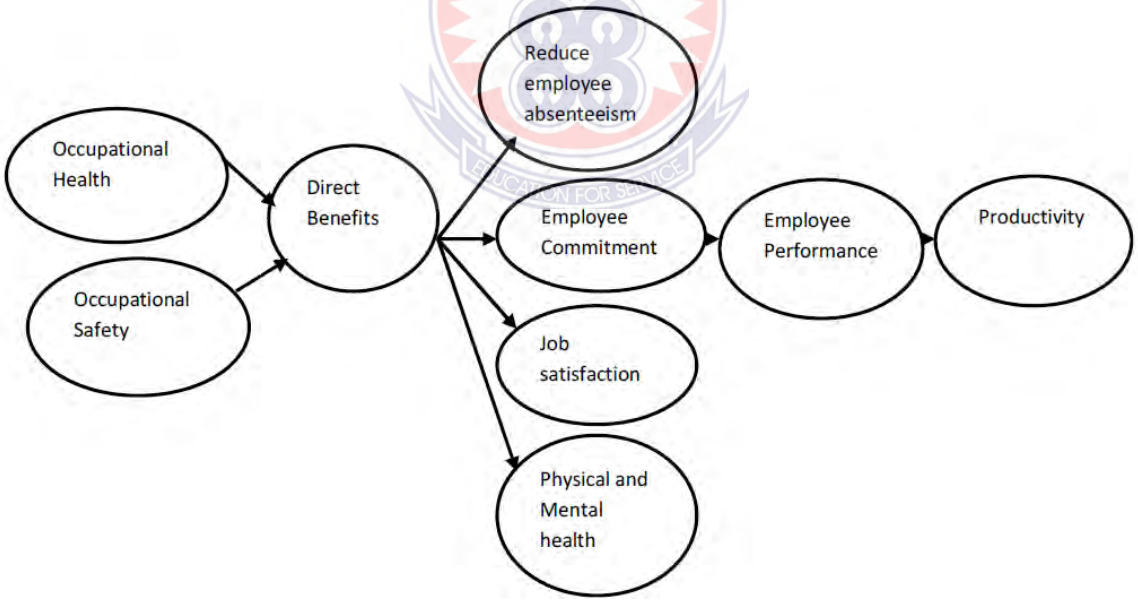


**Figure 1: Conceptual Framework of the Study**

### 2.23 Machine maintenance

According to FAO (1990), it is a fallacy to believe that the economic viability of a sawmilling operation pivots around the most modern available machinery and equipment. Appropriate equipment is of course a necessity, but more important to a successful sawmilling operation is the performance of the machinery and equipment. This performance depends largely on the skill of the personnel involved in operating and maintaining them. Training of operators and technicians is, therefore, generally beneficial to the performance of the equipment, as is maintenance which sometimes does not receive the attention it deserves. Maintenance is the combination of all technical and associated administrative actions intended to retain an item in, or restore it to, a state in which it can perform its required function (www.encyclopedia.com, 2012). There are different types of maintenance, some of which are; breakdown maintenance, periodic maintenance and preventive maintenance (www.encyclopedia .com, 2012).

### 2.24 Breakdown maintenance

It is a type of maintenance where people wait until equipment fail and then repair it. Such a culture is not recommended for sawmills as it may interfere with production and pose a significant amount of threat to the worker.

### 2.25 Periodic maintenance

This is a daily maintenance (cleaning, inspection, oiling retightening) designed to retain the healthy condition of equipment and prevent failure. Just like human life is extended by preventive medicine, the equipment service life can be prolonged by doing preventive machines are essential if efficient and trouble free performance is to be maintained. The recommended servicing and lubrication routines specified by the manufacturers of the

various machines should always be strictly adhered to and the various specified lubricants and spares always available. Likewise, it is essential that during the actual working operations the machines are not operated by anyone who is not fully aware of their designed capacity and competent to work that particular machine. A priority requirement for successful machine are no operation and maintenance is therefore to ensure that the operational manual and maintenance manual of the machine manufacturers are always available and that personnel who are to operate and maintain the machine s are properly trained and fully competent to carry is a detailed illustrated spare parts list and the stock holding of any parts that may need replacing within a specified time as recommended by the various machine manufacturers.

Sawmills machinery and equipment work under conditions which necessitate a strict, well organized routine check with the appropriate remedial action and adjustments being carried out as necessary. Periodic maintenance checks are dealt with under the individual machine headings but it must always be borne in mind that good housekeeping is very important requirement to minimize wear and unnecessary machine damage. Likewise, daily lost time records are essential for the reasons already dealt with under that heading but should also be regard as an early warning system against potential breakdowns which could be avoided.

Modern materials and machine design have resulted in simplified maintenance, particularly in method of lubrication where automatic oiling systems and sealed bearings are fitted. These attachments do not, in any way, reduce the need for a well – organized constant housekeeping programmed whereby all machine are cleaned down at the end of each working shift. Operators on all machines must be fully awareof the importance of it and responsible for making sure it is properly carried out. The following maintenance programmes together with good housekeeping should result in minimizing hazards and loss

of production time if they are carried out efficiently with everyone cooperating. Management must ensure, however, that the essential lubricants and spares are always available and appropriate records kept relevant to the stocks held and their usage over a period of time. These records will also serve as an indicator that things are going wrong and need checking when a sudden increase in their demand occurs.

1. Band head rigs and band re-saws (Daily checks)

a. Saw guides: Check top and bottom guides after each saw change and adjust if necessary.

b. Wheel scrapers and cleaning pads: check top and bottom wheel scrapers and adjust if necessary so that they are bearing lightly and evenly right across the face of the wheels. Where plate or brushes are fitted they should be checked and adjusted accordingly.

c. Lubricant tanks for drip feed lubrication, etc: check the lubricant levels and required feed flow.

d. Saw straining mechanism: Make sure the stain is taken off the band saw during non-working periods and the mechanism is working freely.

e. Top wheel lifting screws: Brush or blow out accumulated sawdust and lubricate screws.

f. Band mill wheels: Remove any accumulated sawdust which has stuck to the inside of the rims or spokes. Check sawdust extraction system, whether pneumatic or mechanical.

g. Saw cleaning assembly: check lubricant tank. Check felt pads for tension and wear.

h. Log carriages: Log carriages range from the simple manually operated units to those fully mechanize with electric set works, pneumatic dogging, cant flippers etc. A powered in-feed log deck, log loading and turning equipment, together with

an out-feed conveyor fitted with off-loading arms, storage under load chains, are used to make the latter a complete one man head rig operation. These installations are often fitted with automatic centralized lubrication systems and relevant maintenance checks should be carried out strictly according to the manufacturer's instructions. Daily maintenance checks on carriages without centralized lubrication should over the lubrication of axle wheel bearings, head blocks, set works and offset operating mechanism.

i. A powered in - feed log deck and fully mechanized carriage for complete one – man head rig operation: Log carriage wheel and rail scrapers should be checked and adjusted if necessary to prevent any build – up of waste on wheel faces or rails. Check all keys, bolts and set screws subjected to shock loads for tightness.

j. Log loading equipment: All log decks and the log loading equipment should be cleaned off daily and where the moving parts are not lubricated automatically, appropriate greasing and lubrication should be carried out. The structure and mechanism is subjected to frequent heavy shocks and all bolts and nuts need to be checked for tightness. Log deck chain channels should be lubricated and drive chains checked for undue slackness.

k. General lubrication and cleaning: unsealed bearing should be greased with the recommended type of grease or its equivalent. Make sure the grease nipples and gun nozzle are clear and pump in sufficient grease to force out the old grease which may have picked up dust and dirt during working operations. Lubricate shaft drives or chain drives to live rolls and check safety guards. Clean and lightly lubricate all machined surface to prevent rust. Remove any accumulation of sawdust and waste from electric motors, driving chains, gears or sprockets and ensure safety guards are in place.

2. A four headlock carriage for logs up to 6 m (20") long with hand operated dogging gear and hand set works. Head taper gear is fitted to the first headlock (weekly checks)

   a. Log loading and turning equipment (pneumatic) check all piping for leaks; oil cylinder piston rods; grease or oil all linkage as required; check all bolts and nuts for tightens; and ensure all cylinders are left in the closed position when not in use to prevent rusting of the cylinder piston rods.

   b. Log loading and turning equipment (hydraulic): check all piping for leaks; check all bolts and nuts for tightness; check all chain drives incorporated in the equipment strictly according to the recommendations of the manufacturer; check the oil level in the tank of the hydraulic pressure assembly; and check oil filters according to instructions given on the filters or as specified by the manufacturer.

   c. Live rolls: Grease all bearing according to the specified instructions, but take care and ensure all grease gun nozzles are not blocked.

   d. Chain drives: Clean and lubricate any drive as necessary.

   Belt drives: Belt drive whether flat or Vee should be checked for tension. The tension should be sufficient to overcome belt slip but over- tightness should be avoided as it reduce the life of the belts and puts excessive loading on the shaft bearings.

**2.26 Industrial Accidents**

Results obtained from 1998-2003 at the Kumasi Metro Labour Department (KMLD) within Ashanti region was 175 cases more than that reported by the Department of Factories Inspectorate (DFI) for the whole country. Analysis of a researcher revealed that out of 185 accidents reported in 1999 only 16 (8 percent) of the total accident was reported for WPL

while the KMLD reported 158 (64.7 percent) injuries for WPI in Kumasi metro in 2001, 40 (18.9 percent) out of 211 accidents recorded by DFI came from WPI. Whiles the KMLD recorded 145 (65.6 percent) injuries for the WPI out of 221 injuries recorded.

In 2003, 26 (18.9 percent) out of 137 accidents were recorded by DFI for WPI whiles KMLD recorded 176 total injuries and out of the 115 (65.3 percent) were from wood processing industry. Thus, the extent of under reporting of industrial accidents in WPI only, ranges from 360 to 980 percent. If this is extended to other sectors of the economy, then, there is no doubt that the use of DFI statistics which has been used extensively in the past would not provide compelling evidences of adoption of Occupational Safety and Health policy in Ghana. It appears that the collection of workmen's compensation provided an incentive for the higher notification record of industrial accidents in the Wood Processing Industry at the KMLD (Ashanti). This may be explained by the key role the labour department plays in the collection of workmen's compensation for injured workers. There was no incentive to notify the DFI accidents even though Act 328 of Factories offices and shop Act 1970 section 10 stipulate the notification of accidents.

**2.27 Health Implications of Sawmill Activities on Workers**

Poor ventilation affects the physical and psychological health of workers. Poor ventilation allows for the accumulation and mixture of hazardous contaminants. The resulting physical effects on workers are harmful. Psychological effects like stress arise when members know they are constantly exposed to ventilation hazards. Poor ventilation also causes extremes in temperature, resulting in fatigue, discomfort and distraction. Poor ventilation can also expose workers to low humidity causing dry throat, dry skin and static electricity build-up. High humidity contributing to bacterial and mould growth.

Excessive and irritating workplace odours, irritation of eyes, nose and throat, headaches, fatigue, and a susceptibility to colds and flu all constitute some hazards of the workplace due

to poor ventilation. Some of these symptoms are less severe away from the workplace (OSHA, 2009).

Poor lighting in the workplace can cause eye strains and irritation, fatigue, double vision, watering and reddening of the eyelids, and a decrease in the power of focus and visual acuity. Headaches as well as neck and back pains may occur as results of workers straining to see small or detailed items. Poor lighting in the workplace is also associated with an increase in accidents. Direct and reflected glare and shadows as well as delayed eye adaption when moving from bright surroundings into dark ones (or vice versa) may prevent an employee from seeing tripping and other similar hazards (OSHA, 2003).

Exposure to continuous and extensive noise at a level higher than 85 dBA may lead to hearing loss; continuous hearing loss differs from person to person with the level, frequency and duration of the noise exposed. Negative effects of noise on human beings are generally of physiological ones. It is possible to classify the effects of noise on ears in three groups: acoustic trauma, temporary hearing losses and permanent hearing loss. Blood pressure increases, heart beat acceleration, appearance of muscle reflexes, sleeping disorders may be considered among the other psychological effects. The psychological effects of noise are more common compared to the psychological ones they can be seen in the forms of annoyance, stress, anger and concentration disorders as well as difficulties in resting and perception (Atmaca *et al*, 2005).

A survey conducted by Melamed et al. (2001) also indicated a positive correlation between noise and blood pressure. Workers who work in sawmills hence may have higher blood pressures compared to other workers in more serene environments (Samuel *et al*, 2001).Exposure to wood dust may cause external and internal health problems. Adverse health effects associated with wood dust exposure include dermatitis, allergic respiratory effects mucosal and non–allergic respiratory effects, and cancer. The American conference of Government industrial hygienist (ACGIH) recognizes wood dust as a ‘confirmed’ human carcinogen. Cancers have been associated with wood dust exposure. The National Institute

for occupational Safety and Health (NIOSH) considers both hardwood and softwood dust to be potentially carcinogenic to humans. The three types of cancers associated with wood dust exposure are nasal and sinus cavity cancer, lungs and other cancers, and Hodgkin's disease. The wood and cancer relationship was studied by Milham (1974), who conducted a mortality study involving the AFL-CIU United Brotherhood of Carpenters and Joiners of America. This study supports the hypothesis that wood contains carcinogenic agents.

Hodgkin's disease has also been associated with wood dust. One study (Milham & Hesser, 1967), which examined 1,549 white males terminally ill with this disease, showed an association between Hodgkin's disease and wood dust exposure. Another study (Spiers, 1969), concluded that men working in wood industries in the eastern United States were at special risk for the disease, due principally to the carcinogenicity of pollen grains from eastern pine species. Plicate acid, an irritant chemical is believed to be the causative agent in western red cedar dust-induced asthma and affects between 4 and 13.5% of exposed populations (Chan-Yeung, 1994).

The American conference of Governmental Industrial Hygienists (ACGIH) has assigned wood dust, all soft and hardwoods, such as beech and oak, and 5mg/m3 for soft wood, as TWAs for normal 8-hour workday and a 40-hour workweek and short- term exposure limit (STEL) of 10 $mg/m^3$ for soft wood, for periods not to exceed 15 minutes. Exposure at the STEL concentration should not be repeated more than four times a day and should be separated by intervals of at least 60 minutes (ACGIH, 1994).

Exposure to extreme heat can result in occupational illness and injuries. Heat stress can result in heat stroke, heat exhaustion, heat cramps, or heat rashes. Heat can also increase the risk of injuries in working as it may also occur as results in sweaty palms, fogged-up safety glasses, and dizziness. Burns may also occur as a result of accidental contact with hot surface or steam (Hope, 2008).

Workers who are exposed to extreme heat or work in hot environments may be at risk of heat stress. Workers at risk of heat stress include outdoor workers and workers in hot

environments such as fire fighters, bakery workers, farmers, construction workers, miners, boiler room workers, factory workers, and others. Workers at greater risk of heat stress include those who are 65 years of age or older, are overweight, have heart disease or high blood pressure, or take medications that may be affected by extreme heat.

Prevention of heat stress in workers is important. Employers should provide training to workers so they understand what heat stress is, how it affects their health and safety, and how it can be prevented. Heat stroke is the most serious heat-related disorder it occurs when the body becomes unable to control its temperature: the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. When heat stroke occurs, the body temperature can rise to 106 degrees Fahrenheit or higher within 10 to 15 minutes, heat stroke can cause death or permanent disability if emergency treatment is not given. Other heat related health issues include heat exhaustion, heat syncope, heat cramps among others (Probst, *et al.* 2008).

Sawmill workers suffer a lot of Musculoskeletal disorders. Work-relation musculoskeletal disorders (WMSDs) are a group of painful disorders of muscles, tendons, and nerves. Carpal tunnel syndrome, tendonitis, thoracic outlet syndrome, and tension neck syndrome are examples. Work activities which are frequent and repetitive, or activities with awkward postures cause these disorders which may be painful during work or at rest. Almost all workers require the use of the arms and hands. Therefore, most WMSD affect the hands, wrists elbows, neck, and shoulders. Work using the legs can lead to WMSD of the legs, hips, ankles, and feet. Some back problems also results from repetitive activities (Mukwewa, 2005).

# CHAPTER THREE

# RESEARCH METHODOLOGY

## 3.1 Introduction

This Chapter discusses the methods and procedures used in collecting data for the study. It involves the description of research design, targeted population, sample and sampling techniques, instrument for the study, data collection procedure and method of data analysis.

## 3.2 Research Design

The researcher used a descriptive survey research design. This study is to sample opinions of workers at Sokoban wood village. A survey design is a plan or blue print which specifies how data relating to a given problem should be collected and analyzed (Nworgu, 1991). This design was therefore considered suitable for the study since it would seek to obtain information from the respondents on assessment of safety practices at the wood village through the use of questionnaire and sampling method. Related studies that involve the use of this design include the impact of wood processing industries in the environment in Kumasi Metropolitan Area conducted by Addai (2002) and awareness of occupational hazards, health problems and safety measures among sawmill workers in North Central Nigeria conducted by Aderibigbe (2010).

Descriptive survey specifies the nature of the given situation. It tries to describe the situation as it currently exist (Gay, 1992). It involves the collection of data to test hypothesis or answer research questions with regards to the current status of the subject matter under study.

## 3.3 Population and Sample

The targeted population for this study was woodworkers registered with the Sokoban wood village in the Ashanti Region. Six hundred and eighty workers at the Wood Village were

targeted. This includes: 124 workers at the sawmill unit, 122 workers at the boring/mortising unit, 102 workers at the sanding unit, 150 workers at the moulding unit and 182 workers at the planning unit. Stratified random sampling technique was used to select respondents from the various units of the wood village. The workers in the wood processing industries were stratified based on the various categories of wood processes that they do. These include sawing, boring, sanding, moulding and planning. The sample size was 252 and was determined in accordance with the mathematical formula: $n = N/ [1 + N (\alpha)^2]$ where n = sample size; N = sampling frame; α = confidence level (Adei & Kunfaa, 2007), as cited in Mark & Mitchual (2015).

Proportional allocation was used in calculating the size that is supposed to be taken from each stratum. The formula adopted by Kathuri and Pals (1993) used in calculating the sample to be taken from each stratum is presented below:

$n^h = N^h/Nxn$ where

$n^h$ = sample size of stratum h (that is the sample size for each unit)

N = Total size of population

n = Total sample size

$N^h$= Population size of stratum h (population size of each department)

**Table 1: Sampled Population**

| Units | Populations | Sampled | % |
|---|---|---|---|
| Sawmilling | 124 | 46 | 18.3 |
| Sanding | 102 | 39 | 15.5 |
| Moulding | 150 | 56 | 22.2 |
| Planning | 182 | 66 | 26.2 |
| Boring | 122 | 45 | 17.8 |
| **Total** | **680** | **252** | **100.0** |

**Source: Author Construct, 2017**

### 3.4 Data Collection Instrument

The instrument used for the study was a questionnaire. The instrument was made up of a structured questionnaire in collecting data for the study. A structured questionnaire restricts the respondents to the range of possible answers (Olaitan et al., 2000). Part one was used to obtain information concerning the demographic data of the respondent such as gender, length of service, level of education and department. Part two contained information on awareness of occupational health and safety by the wood workers at the village. Part three comprised the use of safety practices for work, it consist of assessment on personal protective equipment, and machine maintenance. Part four sought for information on safety gargets put in place for machine users with 37 items. This is because selected machines used for the various operations were selected to assess the safety gargets put in place for users. Part five comprised of the effects of wood processing and the health implications on the wood worker at the village.

The instrument was first validated by three experts in the Department of wood and construction Education, University of Winneba, Kumasi campus, and two specialists in wood processing in KNUST. They certified the adequacy, suitability and coverage of the items on safety practices in wood processing. Some suggestions such as the inclusion of more items on certain areas were made by the experts to improve on the construction of the questionnaire items.

The instrument was tried on 30 workers in wood processing industries in Kumasi at lumber logs limited (LLL). On the collection of the instrument, the reliability coefficient of the instrument was determined using Cronbachalpha. The Cronbach alpha was computed using Statistical Package for Social Sciences (S.P.S.S). The coefficient obtained from the five sections of the instrument was 0.73 which is considered adequate.

### 3.5 Data Collection Procedure

Robson (2002) caution that some respondent do not treat questionnaire seriously. To ensure that this does not happen, the questionnaire was administered and retrieved personally by the researcher. A period of four weeks was used for respondents to answer questions at the wood village in November 2016. A total number of 252 questionnaires were distributed. The numbers of questionnaires successfully completed and returned were 247.This represent a return rate of about98%.With the Proportional allocation of each stratum, Sawmilling = 46, sanding = 39, Moulding = 56, planning = 66, boring=45. The researcher ensured respondents' anonymity and confidentiality in responding to the questions.

### 3.6 Method of Data Analysis

In relation to the related research questions and the items displayed in the questionnaire, descriptive statistics was used for the analysis. Correlation analysis was performed to establish the associations between respondents' awareness and willingness to use personal safety equipment.The results was presented in percentages and tables to display the data. Tables with frequencies and percentages ensured that the issues are made clear to give visual impression on values without necessarily reading long sentences and also to help in the discussion and interpretation of the data collected. The data was coded and SPSS (Version 16) computer software employed to do the analysis accordingly. The appropriate numbers for each datum was placed in the appropriate data file for the analysis. Summaries of all responses under each item were then given. Thus illustrating the percentage that strongly agree, agree, disagree or strongly disagree.

### 3.7 Ethical consideration

Ethical consideration was given in order not to invade the privacy of the respondents. Respondent's anonymity and confidentiality was assured. Prior notice was given to them as the researcher made a personal visit to inform management and arrange for the data collection at the wood village. Respondents were free to answer and skip any question they considered difficult and no name or any form of identity was required in responding to the questionnaire and all citations used in this text were duly acknowledged.

# CHAPTER FOUR

# RESULTS AND DISCUSSION

## 4.1 Socio-demographic Characteristics of Respondents

The socio –demographic characteristics of the respondents includes gender, work experience, educational level, and the type of operations performed, workforce of each department and the total workforce at each unit of the wood village. These variables were taken into consideration because they influence the choice of the job of the people especially that the study was carried out among workers in a wood village

**Table 4.1: Demographic characteristics of respondents**

| Variable | Frequency (N) | Percentage (%) |
|---|---|---|
| Gender | | |
| Male | 247 | 100.0 |
| Female | - | - |
| **Total** | **247** | **100.0** |
| How Long have you been doing this work | | |
| Below 1 year | 27 | 10.9 |
| 1 – 5 years | 94 | 38.1 |
| 6 – 10 years | 65 | 26.3 |
| 10 years and above | 61 | 24.7 |
| **Total** | **247** | **100.0** |
| What is your level of Education | | |
| Non formal education | 29 | 11.7 |
| M.S.L.C / J.H.S | 92 | 37.2 |
| SSSCE / G.C.E.O. level | 71 | 28.7 |
| H.N.D / A Level | 55 | 22.3 |
| **Total** | **247** | **100.0** |
| What operations do you do | | |

| | | |
|---|---|---|
| Sawmilling | 46 | 18.3 |
| Sanding | 39 | 15.5 |
| Moulding | 56 | 22.2 |
| Planning | 66 | 26.2 |
| Boring | 45 | 17.8 |
| **Total** | **247** | **100.0** |
| What is the work force of your establishment | | |
| 1-10 | 150 | 60.7 |
| 11-20 | 28 | 11.3 |
| 21-30 | 39 | 15.8 |
| 31-40 | 12 | 4.9 |
| More than 40 | 18 | 7.3 |
| **Total** | **247** | **100.0** |
| What is the total work force of this establishment | | |
| Less than 5 | 19 | 7.7 |
| 5 – 10 | 122 | 49.4 |
| 11 – 20 | 77 | 31.2 |
| More than 21 | 29 | 11.7 |
| **Total** | **247** | **100.0** |

**Source: Field work, 2016**

From Table 4.1, all respondents representing 100% were males with no respondent being female. In finding out why there were only males, most of the respondents indicated that it because the nature of work in the wood industry demands a lot of physical strength for execution, the use of heavy machines, lifting of heavy objects and the tedious nature of processing wood.

When the respondents were asked the duration of their stay in their respective skill area (working experience), out of the 247 respondents 27(10.9%) of the mindicated that they have been working at the village for less than one year, while 94 (38.1%) have spent between 1 - 5 years, 65 (26.3%) have worked for between 5 - 10 years, 61(24.7%) have worked at the

village for over 10 years. The study indicates that the number of people who work for long period of time in the wood industry are very few, this may be due to the hazards that workers are exposed to which has a detrimental effect on their health thus causing many of them to resign or leave for other jobs in no time. This is in consistent with a study conducted by (Adei & Kuufaa) which reveals that wood workers are highly exposed to at least one hazard as workers of a wood processing company declared at least one health complaint such as skin burn, red eyes, headache and chest/throat pains which were reported by more than74% of the workers. This was backed by reports on a clinical registers which indicated that the main four health problems were backaches (68%) ophthalmic problems (49%), nasal irritations (46%) and chest and throat problems (34%).

In addition to the usual wood processing risks such as wood dust, noise and heat, workers also reported exposure to heavy lifting and pulling movements which constitute71%, flying and falling objects (53%), awkward positions( 56%), sharp metals and objects (77%), slips and trips (33%), night shift (92%), meeting production quotas(27%) and stress (23%) (Adai & Kuufaa).Their findings further indicated that majority of workers resign after working for few years in the wood processing company when taken ill(Adai & Kuufaa).

It is also obvious that majority of the workers have had 1-5 years working experience at the wood village and as long as a worker stays at a work place for long, the more experienced he or she becomes.

The study also revealed that , 29 respondents representing (11.7%) had no any form of formal education, 92 (37.2%) had Middle School Leavers Certificates or Junior High School Certificates, 71 (28.7%) had their secondary education or G.C.E.O level Certificates while 56(22.6) of the respondents had their H.N.D or Advanced Level Certificates. The results show that a good number of the respondents ended their education at the basic level. At this stage they have no employerable skills for officejobs.37.2% of the respondents representing

those at the basic level is a clear indication that because they have no skills to fit themselves in the formal sector but have to fend for a living found themselves at this wood village for manual jobs such as exist there.

On the work force of the various units, 150 respondents representing 60.7% said the unit work force was between 1 to 10, 28 respondents representing 11.3% were of the view that their unit work force was between 11 and 20, 39 respondents representing 15.8% indicated that their unit workforce was between 21 and 30, 12 respondents representing 4.9% also indicated that their unit workforce was between 31 and 40 with the remaining 18 respondents representing 7.2% asserting that their unit workforce was more than 40. The outcome of this result has become clear that averagely the workforce of each unit is less than 20. This has made most of the units to run one stream that is they all come to work in the morning and close in the evening.

### 4.2 Woodworkers' Awareness of Occupational Health and Safety Practices

Health and safety in the wood working sector can only be pursued comprehensively, by integrating all spheres of work, (Steenkamp 2002).The nature of work in wood processing industries, type of equipment and material handled present on the job all influence the nature of hazard (Judd 2004).Traumatic occupational accidents in the wood sector represent a significant public health concern.

The results in Table 4.2 below show the mean ratings and the corresponding standard deviations of the indicators of the elements of awareness of occupational health and safety by respondents. Table 4.2 also indicates the resultant mean rating of all the indicators of the awareness of occupational health and safety by the respondents (Item # 28). The theoretical mean rating for this part of the study which used a six-point likert scale was 3.0. The mean rating of the 247 respondents on their awareness of occupational health and safety practices ranged from 3.14 ($SD$ = 1.169) to 5.92 ($SD$ = 0.382). This result suggests that with the

exception of the item which reads “wood workers need face shield” had mean rating exceeding the theoretical mean of 3.0. The value of 3.14 for the item “wood workers need face shield” suggests that the respondents have the perception that wood workers do not need face shield or rarely use face shield. The highest mean rating of 5.92 (*SD* = 0.382) related to the item “Electrical gargets should be put off before leaving the plant” (Item # 9) suggest that wood workers at the wood village have the perception that before workers leave the site all electrical gargets should be put off. This is to ensure safety of the work place. The high awareness of occupational health and safety issues by the wood workers of the wood village is as a result of several safety training given to them as indicated by most of them.

**Table 4.2: Descriptive statistics of ratings on awareness of occupational health and safety issues**

| Item # | Elements of awareness of health and safety practices | Mean rating (n= 247) | Standard deviation |
|---|---|---|---|
| | **A. Personal Protective Equipment** | | |
| 1 | wood workers need safety boot | 5.26 | .860 |
| 2 | wood workers need gloves, or mittens | 5.05 | .906 |
| 3 | wood workers need overall | 5.02 | .933 |
| 4 | wood workers need goggles | 4.98 | 1.105 |
| 5 | wood workers need nose or mouth mask | 4.80 | 1.158 |
| 6 | wood workers need helmet | 4.59 | 1.280 |
| 7 | wood workers need earplugs or ear muffs | 4.35 | 1.440 |
| 8 | wood workers need face shield | 3.14 | 1.969 |
| | **B. Machines** | | |
| 9 | Electrical gadgets should be put off before leaving the plant before leaving the plant | 5.92 | .382 |
| 10 | Woodworkers should adhere to machine safety rules | 5.85 | .421 |
| 11 | only trained personnel need to operate the machines | 5.82 | .610 |
| 12 | Machine guards and fences need to be in place before using it | 5.64 | .977 |
| | **C. Working environment** | | |
| 13 | Ventilation at the wood processing plant need to be adequate. | 5.39 | .681 |
| 14 | Adequate lighting is needed at the work place | 5.00 | 1.090 |
| 15 | Noise at wood processing plant need to be within acceptable level | 4.70 | 1.449 |
| 16 | Excessive heat in your workspace should be avoided | 4.50 | 1.409 |
| 17 | Adequate dust harvesters is needed at the processing plant | 4.21 | 1.744 |
| | **D. Training** | | |
| 18 | On the job training is needed for new employees | 5.19 | .966 |
| 19 | Woodworkers need to attend frequently safety workshops | 4.88 | 1.214 |
| | **E. Health** | | |
| 20 | Medical care scheme is needed for all workers | 5.16 | 1.475 |
| 21 | wood processing could lead to minor injury | 4.53 | .740 |

| | | | |
|---|---|---|---|
| 22 | wood processing could lead to skin irritation /dermatitis | 4.46 | 1.216 |
| 23 | wood processing could lead to nausea | 4.31 | 1.100 |
| 24 | wood processing could lead to major injury | 4.18 | .745 |
| 25 | wood processing could lead to hearing loss | 4.11 | .710 |
| 26 | Wood processing could lead to constant headaches | 3.92 | .928 |
| 27 | wood processing could lead to lack of appetite | 3.59 | 1.437 |
| **28** | **Resultant Mean and Standard deviation** | **4.76** | **1.037** |

**Source; Field Survey, November 2016**

In the wood-working industries of Ghana, occupational health, safety and hygiene are not perceived as an urgent priority, Matoone (1997). The company owners do not provide adequate finance for maintenance as well as the purchase of protective clothing MOH (1998). There is not much attention given to the safety of processing machines, equipment, tools as well as their link to health requirements. There is no guarantee of safe and healthy working conditions from employers or an adequate regime for their rest and nutrition. Employees are also only provided the barest of protective clothing they need and without any instructions of how to use it. Workers also indicated that exposure to dust and noise was due to the lack of control at source, Amedofu (2002). Despite being aware of a number of occupational and environmental health hazards, there are no clear policies for the woodworking sector. Some of the measures used in the sector are outdated and donot comply with occupational safety and health standards. These tended to discourage employees from adhering or applying them Adei & Kuufaa (2007).

The resultant mean rating of the awareness of safety by the respondents' which is 4.76 (*SD* = 1.037) compared to the theoretical mean of 3.0 suggests that the workers in the wood processing industry are aware and not ignorant of the need for occupational health and safety practices and hazards.

This result is inconsistent with that of Kwankye (2012), he stated that injuries and illness in the wood processing sector of Kumasi are caused by exposure to occupational hazards. Hazards include any aspect of technology, or activity that poses risks. The level of risk is primarily the combination of two factors: the level of toxicity or amount of energy present and the degree of exposure. In the same vein, Steenkamp (2002) states that health and safety in the wood processing sector can only be pursued comprehensively, integrating all spheres of work and the nature of work in wood processing industries, all influence the nature of hazard. The results indicated that wood workers were aware of the use of protective equipment and how it could prevent or reduce the risk of accident at the work place. It is therefore concluded that 99.3% of respondents agreed that the use of protective equipment could reduce hazards at the work place. In line with the study conducted by Osagbemi, La-Kadri and Aderibigbe (2010), they had a contrary opinion. The study was on the "Awareness of Occupational Hazards, Health Problems and Safety Measures among sawmill workers in North Central Nigeria". They found that the level of awareness of various occupational hazards among wood workers in North Central Nigeria was low. This study at the wood village revealed the fact that most of the respondents (99.3%) who are experienced woodworkers and had worked for over 5 years in the wood village, they appear to been aware of existing or potential risks involved in their operations. This could also be as a result of various reasons like institutional training, adaptation of regulatory measures for safety precautions might have contributed to their high awareness of occupational health and safety issues related to their work.

The finding was however consistent with Matoone (1997) in his study of wood working enterprise in Lesotho, wood workers do not pay attention to the use of safety equipment, workers could be sported with their nose mask on their fore head as they find them uncomfortable to use.

### 4.3 Attitudes and Behaviours of Workers towards Safety Practices

Occupational Safety and Health (OSH) at work is an issue affecting all businesses. Occupational health and safety can be important for several reasons, in that, good OHS practice can reduce employee injury and illness-related costs. A series of regulations have been introduced under OSHA 1994 in Malasia. The emphasis of these regulations has been on establishing mechanism to implement OSH in work places. Workplaces with five or more workers are required to formulate a Safety and Health Policy. The Safety and Health Committee Regulations 1996 of Malasia requires establishments with 40 workers and above to establish a safety and health committee. The committee is required to meet at least once in every three months, with the functions to identify hazards at the workplace, institute control measures, and investigate incident and conducting audit. This will help reduce cost associated with sick leave and disability benefit. Even though most of these costs could be prevented or significantly reduced through implementation of sound prevention, reporting and inspecting practices, they persist at various workplaces and the wood village is not an exception. Table 4.3 indicates the mean and the resultant mean ratings as well as their corresponding standard deviations of practice of safety by the respondents. The mean rating of the 247 respondents on the use of personal protective equipment ranged from 1.77 for (item # 7) to 3.61 for (item # 1).

### 4.3.1 Personal Protective Equipment

The ratings of the responses for safety practices in terms of machine and maintenance ranged from 4.72 for item # 7 to 4.90 for item # 1 and3. The resultant mean rating of the respondents' practice of safety was 3.936. With the exception of the items "do you wear earplug or earmuffs when working" and "do you wear helmet when working" which had their mean scores being lower than the theoretical mean which was 3.0, all items had their means being higher than the theoretical mean of 3.0.

This suggests that the workers of the wood village studied rarely or never wore helmet, earplug or earmuffs, when working. Moreover, the workers would often: insist that only trained personnel operate machines, ensure that workers adhere to safety rules, ensure that saws are adequately conditioned, and ensure that worn out chains and ropes are changed. This further explains that during wood processing in primary industries such as sawmills, plywood mills and secondary industries that produce furniture, cabinets and other products, the employee who operate a machine must wear protective equipment and must follow safety regulations concerning machine operations Matoone (1997). Those who work in finished areas must be provided with dust safety device. Developing an appropriate policy could serve as a guide for workers in industries to avoid accidents. This finding is in support of Geneva (1991) who identified some preventive measures such as the handling of sharp objects with extreme care and protecting hands with chemical- resistant gloves.

**Table 4.3: Personal Protective Equipment**

| Personal Protective Equipment | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|
| | **F(%)** | **F(%)** | **F(%)** | **F(%)** | **F(%)** | **Mean** |
| 1.do you wear gloves / mittens when working | 53(21.1) | 63(25.2) | 117(46.8) | 17(6.8) | - | 3.61 |
| 2 do you wear overall when working | 40(16.0) | 32(12.8) | 158(63.2) | 15(6.0) | 5(2.0) | 3.52 |
| 3.do you wear goggles when working | 53(21.2) | 54(21.6) | 115(46.0) | 26(10.4) | 2(0.8) | 3.38 |
| 4.do you wear face shield when working | 38(15.2) | 55(22.0) | 122(48.8) | 35(14.0) | - | 3.35 |
| 5.do you wear nose and mouth mask when working | 55(22.4) | 27(11.0) | 124(50.6) | 27(11.0) | 12(4.9) | 3.35 |
| 6.do you wear earplug or ear muffs when working | 11(4.4) | 34(13.6) | 82(33.1) | 52(21.0) | 69(27.8) | 2.46 |
| 7.do you wear helmet when working | 25(10.1) | 6(2.4) | 15(6.0) | 43(17.3) | 159(64.1) | 1.77 |
| **Machines and maintenance** | | | | | | |
| 1.do you ensure that electrical gadget are put off before they leave the plant | 53(21.1) | 63(25.2) | 117(46.8) | 17(6.8) | - | 4.90 |
| 2.do you ensure that trained personnel operate the machine | 40(16.0) | 32(12.8) | 158(63.2) | 15(6.0) | 5(2.0) | 4.84 |
| 3.do you ensure that saws are adequately conditioned | 53(21.1) | 63(25.2) | 117(46.8) | 17(6.8) | - | 4.90 |
| 4.do you ensure that guards and fence are place when machine are to be use | 38(15.2) | 55(22.0) | 122(48.8) | 35(14.0) | - | 4.82 |
| 5.do you ensure that they maintain and repairs machines | 55(22.4) | 27(11.0) | 124(50.6) | 27(11.0) | 12(4.9) | 4.79 |
| 6.do you ensure that they adhere to safely rules | 11(4.4) | 34(13.6) | 82(33.1) | 52(21.0) | 69(27.8) | 4.78 |
| 7.do you ensure that worrn out chains and ropes are changed | 25(10.1) | 6(2.4) | 15(6.0) | 43(17.3) | 159(64.1) | 4.72 |
| **Resultant mean Rating** | | | | | **3.936** | |

**Source: Field survey, November 2016 N= 75, 5= Always, 4 = usually, 3= Sometime, 2 = Rarely, 1= Never**

The mean rating of 4.90of the respondents, especially on the use of personal protective equipment was a true reflection of what pertains at the wood village studied. This finding is in agreement with Osha (1993) who stated that the main risk control strategies include avoiding risks, reducing risks and transferring risks. Risks could be avoided by phasing out hazardous substances such as chemicals, wood dust and particles of metal. Safety measures are an integral part of workers' activities in industries to protect themselves from risk. The finding revealed that the use of safety to manage people is a measure for improving the management of occupational hazards in wood processing industries. This finding is in agreement with Oguntola (1992) who stated that the basis for industrial safety are clean and tidy habits ,good discipline, strictly prohibition of unauthorized experiment, knowledge and understanding of the likely hazards and observation of all guiding rules and wearing the appropriate safety equipment. Indeed, some of the workers were seen either in "slippers" or "canvass" some were using rags or duster as nose mask and face shield or in T-shirts which do not protect their foot/toes and bodies. (See Figure 4.3, 4.4 and 4.5 below).

Also, almost all the workers were not in goggles, helmet, nose and mouth mask, and overall ,(seeFigure4.3, 4.4, and 4.5 below), gloves/mittens or earplugs. Workers could be proficient in all the activities in wood processing industries if proper training is acquired and practiced. Training can be considered as the creation of learning opportunities. Adequate training of employees and the use of appropriate strategies could improve on the management of hazards. Training is a process that develops and improves skills related to performance. Training of workers could be done to improve on productivity. It could start from inexperienced workers but also to experienced workers. Employers who provide all new employees with training on safe and proper job procedures experience fewer accidents (Juergen, 2005). Training is needed by employees who wear personal protective equipment and workers in high risk areas. Managers and supervisors should also be included in the training programme. Supervisors should receive training in company policies and procedures

as well as hazards detection and control accidents, handling of emergency and how to train and reinforce training.

This result is inconsistent with the outcome of a study conducted by Osagbemi, La-Kadri, and Aderibigbe, (2010) and Ochire-Boadu, Kusi and Lawer (2014) on the theme "Awareness of Occupational Hazards, Health Problems and Safety Measures among Sawmill Workers in North Central Nigeria. They concluded that less than 20% of the sawmill workers wore protective devices/clothing and this was due to the fact that health and safety standards were neither practiced nor enforced. Training for managers should emphasize their role in supporting the safety and health programme, Managers should pay a particular attention to new employees and to employees who are moving to new jobs. Train the employees on the hazards they could be exposed to and how to protect them and undertake management and health responsibilities for the staff.

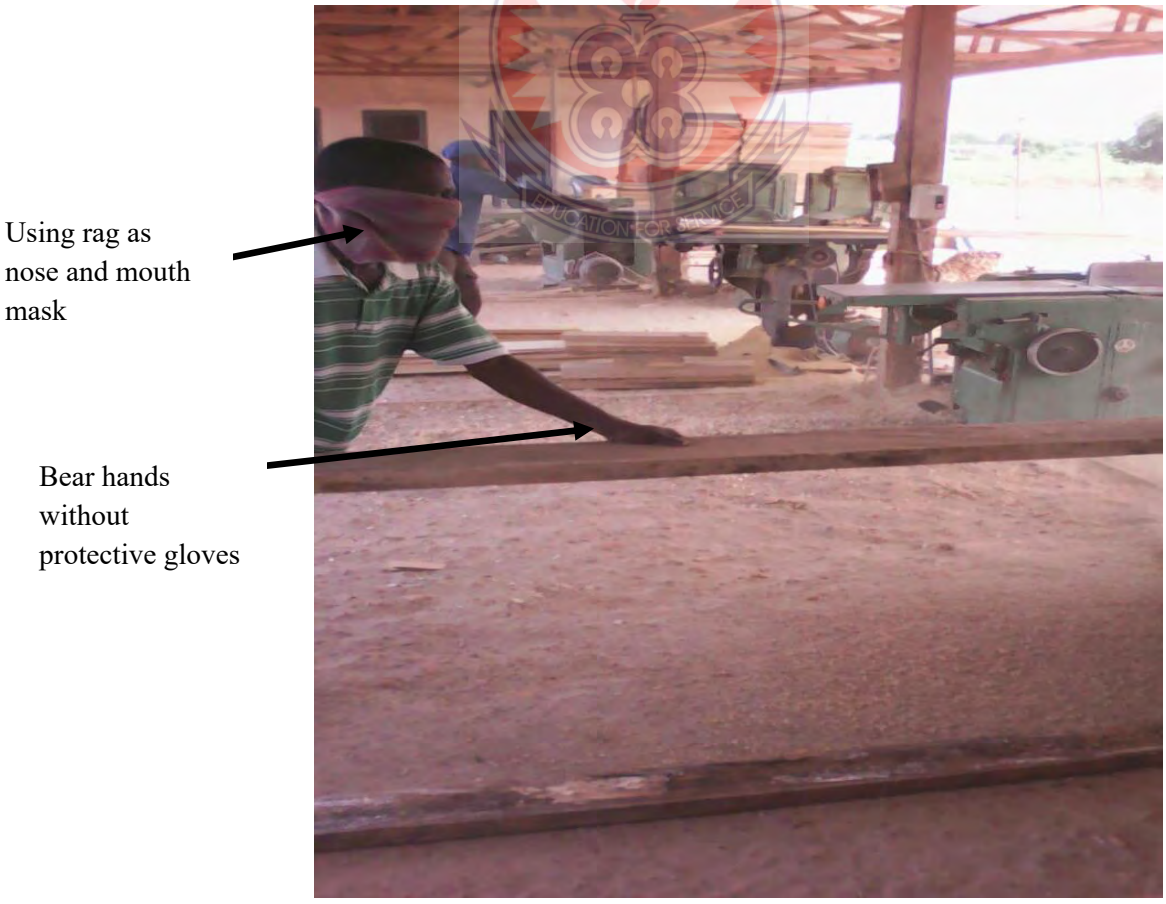


**Figure 4.3: Workers without protective equipment. Using dusters to cover nose and mouth and bear hands without gloves.**

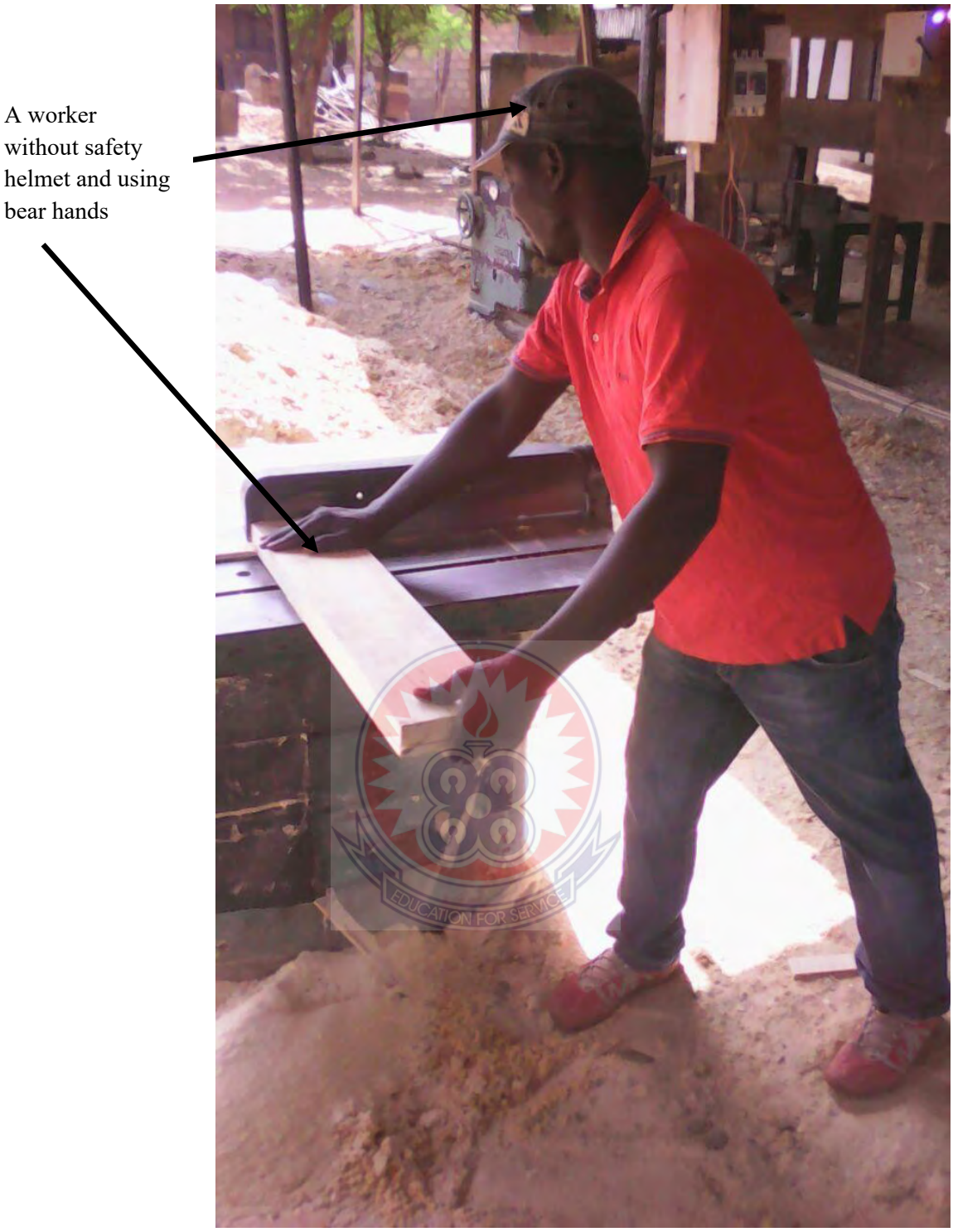


**Figure 4.4: Workers without protective equipment. Bear hands without hand gloves and helmet to protect the head from falling objects.**

A worker without safety boots to cover feet

**Figure 4.5: Workers without protective equipment .wearing slippers, no overall or over coat**

A worker and sleepers while lifting heavy wood

**Figure 4.6: Workers without protective equipment**

### 4.4 Provision of Personal Protective Equipment

This part of the study indicates the mean ratings of each of the eight items by the respondents on provision of personal protective equipment for work. The mean ratings were computed and compared with the theoretical mean of 3.0 for the five-point likert scale. The mean ratings of the eight items as indicated on Table 4.4 shows that the ratings of the respondents' on the provision of protective equipment ranged from 3.02 (*SD* = 1.515) to 4.93 (*SD* = 0.721).

**Table 4.4: Descriptive statistics on rating of provision of personal protective equipment**

| Item # | Elements of willingness to use personal safety Equipment | Mean rating (n = 247) | Standard deviation |
|---|---|---|---|
| 1 | I am provided with gloves/mittens during wood processing | 4.69 | 0.780 |
| 2 | I am provided with overall during wood processing | 4.53 | 0.961 |
| 3 | Safety boots are made available during wood processing | 4.93 | 0.721 |
| 4 | I am provided with goggles during wood processing | 4.65 | 0.801 |
| 5 | I am provided with face shield during wood processing | 3.02 | 1.515 |
| 6 | I am provided with nose and mouth mask during wood processing | 4.83 | 0.609 |
| 7 | I am provided with earplugs during wood processing | 4.79 | 0.752 |
| 8 | I am provided with helmet during wood processing | 3.72 | 1.271 |
| | **Resultant Mean and Standard Deviation** | **4.27** | **0.929** |

**Source: Field survey, November2016**

All the items (1- 8) had their mean rating ranging from 3.02 (*SD* = 1.515), to 4.93(SD=0.721), all greater than the theoretical mean of 3.0. The mean rating of 3.02 for the item "I am provided with face shield during wood processing which is the smallest among the ratings" suggests that most of the respondents were rarely or not using face shields during

wood processing. The provision and use of personal protective equipment could include using gloves, goggles, aprons, safety boost and dusts masks. These help to ensure the efforts to eliminate the accidents and implement the hazards control. This result is consistent with a study conducted by Adei & Kunfaa, (2007), for which they concluded that most of the woodworkers in the firm studied were unwilling to use their face shield/goggle and nose mask. They rather place them on their forehead because according to them they find them uncomfortable to use.

The mean ratings for the other items being greater than 3.0 suggest that the woodworkers used for the study were provided with gloves, overall, safety boots, goggles, nose and mouth mask, earplugs, and helmet during wood processing. But unwilling to use them. This according to studies conducted by Boy(2002) indicated that majority of workers in the wood processing industries worked under extremely hazardous conditions without putting on the appropriate protective clothing. Boy (2002) noted that the wood working industry in Italy ranks among the most hazardous industries in that country. The potential sources of workplace injuries include rotating devises, cutting or shearing blades, in-running pinpoints and meshing gears while crushed hands, severed fingers, amputations and blindness are the typical accidents. The research again supports Adei & Kuunfaa (2007) findings which conclude that this result is possibly due to the fact that the respondents were aware of the physical, ergonomic, mechanical and chemical hazards associated with their occupation and therefore are willing to take the necessary precautions to protect themselves and others against these hazards.

### 4.5 Assessment of Safety Gadgets on Wood Processing Machines

In this part of the study the respondents were to ' respond to the availability of safety gadgets whether they exist, does not exist or improvised on a five-point likert scale.

**Table 4.5: Respondents view on whether safety gadgets were put on machines for users**

| Item | Safety gargets put in place for machines users | Exist | Does not exist | improvised |
|---|---|---|---|---|
| | **BORING / MORTISING** | | | |
| 1 | A guard enclosing the bit and the chuck. | 4(8.0) | 32(71.0) | 9(21.0) |
| 2 | Enclosement of the cutting chain and driving mechanism. | 4(8.0) | 28(63) | 13(28.0) |
| 3 | emergency stop switch | 2(5.0) | 5(11.0) | 38 (85.0) |
| 4 | Safety chain to anchor or bold counter weight from dropping | 7(16.7) | 22(48.1) | 16(35.2) |
| 5 | Inverted U-shaped guard that covers Operating treadles | 9(20.4) | 23(50.0) | 13(29.6) |
| 6 | Operators manual to guide operation of machine | 4(8.0) | 7(15.6) | 34(76.4) |
| | **MOLDING MACHINE** | | | |
| 1 | The belts and pulleys completely enclosed with sheet metal or heavy mesh guards | 3(5.9) | 34(60.0) | 19(34.1) |
| 2 | Cutter head covered with metal guard or cage | 2(3.5) | 32(56.5) | 22(40.1) |
| 3 | guard feet rolls with wide metals strip or bars that allow boards to pass | 4(6.7) | 38(68.2) | 14(25.1) |
| 4 | Safety shield | 11(20.0) | 39(70.0) | 6(10.0) |
| 5 | Anti-kickbacks fingers installed in the in-feet site across the width of the machine | 12(22.0) | 36(63.4) | 8(14.6) |
| 6 | Operators manual to guide operation of machine | 11(20.0) | 45(80.0) | - |
| 7 | Wood clamp | 4(7.7) | 52(92.3) | - |
| 8 | Power transmission devices enclosed | - | 56(100) | - |

**Source: Field survey, November 2016**

**Table 4.5 Cont'**

| | SANDING MACHINE | Exist | Does not exist | improvised |
|---|---|---|---|---|
| **1** | Guard feed rollers with a semi cylindrical guard to prevent contact with in-running rolls | 3(6.7) | 30(75.9) | 6(17.8) |
| **2** | A guard on the unused run of the sanding belt against accidental contact to prevent the operators hands or fingers from contact with the nip ends | - | 30(75.9) | 9(24.1) |
| **3** | Guard to enclose drum and disc sanders | 2(4.4) | 28(72.2) | 9(24.1) |
| **4** | Fixed guards enclosing power transmission pulleys | - | 31(79.6) | 8(20.4) |
| **5** | Operators manual to guide operation machine | - | 32(83.3) | 7(16.7) |
| | **PLANNER** | | | |
| **1** | Operators manual to guide the operation of the machine | - | - | 66(100.0) |
| **2** | Cutter head enclosed with an automatic guard or cage | - | 40(60.0) | 26 (40.0) |
| **3** | stick to push work pieces that are short | - | 66(100.0) | - |
| **4** | Sheet metal or heavy mesh guard to enclose belt and pulleys | - | 49(69.5) | 17 (30.5) |
| **5** | Guard feet rollers with a wide metal strip or bar that allow boards to pass | - | 48(72.4) | 18(27.6) |
| **6** | Provide barriers at the loading and unloading ends to keep hands out of point of operation | - | 47(71.0) | 19(29.0) |
| **7** | Power transmission system enclosed | - | 56(85.1) | 10 (14.9) |

**Source: Field survey, November 2016**

**Table 4.5 Cont'**

| | SAWING MACHINE (BAND SAW) | Exist | Does not exist | improvised |
|---|---|---|---|---|
| 1 | Operators manual to guide the operation of the machine | 66 (100.0) | - | - |
| 2 | Adjustable metal top guard to provide a barrier for the blade except at the point of operation | - | - | 46 (100.0) |
| 3 | emergency power switch | - | - | 46 (100.0) |
| 4 | Pulley mechanisms fully enclosed with guard | - | - | 46 (100.0) |
| 5 | Installation of break on one or both wheels to minimize the potential of coasting after the saw has been shut off. | - | - | 46 (100.0) |
| 6 | Tension control device to protect the blade from breaking | - | - | 46 (100.0) |
| | **CIRCULAR SAW** | | | |
| 1 | Operators manual to guide operation of machine | - | 44(97.9) | 2(2.1) |
| 2 | A guide for the belt and pulley | - | - | 46(100.0) |
| 3 | An anti-kickback device | - | 20(42.6) | 26(57.4) |
| 4 | A blade guard | | 22(47.9) | 24(52.1) |
| 5 | An emergency off/on switch | - | 38(82.6) | 6(14.1) |

**Source: Field survey, November 2016**

From Table 4.5, respondents were asked on whether various safety gadgets were easily assessed during the delivery of their work. The availability of safety gadgets were assessed on the following scope; boring/mortising, moulding machine, sanding machine, planner, sawing machine and circular saw machine.

On boring/mortising, the respondents were asked the various safety gargets available on their machines. Majority of the respondents confirmed nonexistent to most of the safety gadgets some were improvised and the least on the other hand per the respondent's indication really exist.

The safety gadgets availability under moulding machine indicated by majority of the responses as nonexistence, followed by improvised while the least affirmed existence of some safety gadgets.

Also, most of the safety gadgets used in the sanding machine section were nonexistent, some were improvised and least were existent.

Majority of the safety gadgets under the heading 'planner (planning machine)' were non-existent. The least however were improvised. None of the respondents confirmed existence of safety gadgets.

The safety gadgets assessed under band saw per majority of the respondents' agreement indicated that apart from gadgets such as Operators manual to guide the operation of the machine which was confirmed by all 66(100%). Adjustable metal top guard to provide a barrier for the blade except at the point of operation, emergency power switch, Pulley mechanisms fully enclosed with guard, Installation of break on one or both wheels to minimize the potential of coasting after the saw has been shut off and Tension control device to protect the blade from breaking were improvised. Finally, majority of the safety gadgets at the circular saw were non-existent with few respondents confirming improvised. These results of the non-availability of safety gargets on machines confirm a empirical data.

A Study conducted by Bello (2010) in Nigeria, in wood processing industries, indicated that a total of 140 injury cases were recorded among 64 workers. The results showed that mill operators suffers highest rates of 83% while moving planks of wood into milling machines such as moulder machine, timber stacking accidents accounted for 36% while transport

accidents is 22%. Machine operators were the hardest hit with 83%.Further more injuries occurring to body parts include upper limb 68%, back and lower injuries 58%. In the case of Nigeria wood processing industries, a major risk factor noticeable in the factory was age factor of machines and equipment in use. Most of the machines were obsolete with most of the safety guards removed and non-functional. It was also noted that from the study, the respondents notion about the concept of health and safety rules for operations in timber processing do not give preference to basic safety training in hazardous operations. None of the workers had attended safety training in the previous years. In most cases most of the workers entered the timber industry not as trained wood industry workers with a requisite professional knowledge. This had exposed most of the workers to some untold level of hazards (Bello 2010).

Another study conducted by Boy (2002) for which he concluded that most of the woodworkers in the firm studied were machine operators who operated on machines without safety gadgets. They were either improvised, because according to them management was a bit reluctant in fixing some of the broken down safety gargets. This result is possibly due to the fact that the respondents and their managers were aware of hazards associated with their occupation but were not provided with the necessary precautions to protect themselves and others against these hazards. With the stick to push work pieces that were shot, this was too basic but was ignored by managers, but such can lead to serious injuries.

Also a study conducted by Matoone (1997) reported that, in Lesotho, out of ten woodworking companies,(four large and six small) industries in that country, only one small company had an OSH policy, indicating little commitment on the part of small companies in adhering to OSH regulations. Furthermore in support of Odhiambo (2003) studies, safety gargets and Equipment are the main measures adopted to mitigate the effect of hazards in all the Wood Processing Industries. These were safety boots, overall coat, nose masks, ear protectors,

goggles and gloves and safety gargets on machines. Generally, apart from the PPE‟s not being adequate and not properly used, there was lack of enforcement in their use. It was also found that workers and supervisors on the factory floor did not also wear Personal Protective Equipment. This is a clear indication that when there is strict inspections, education and enforcement of the rules and regulations , and orientate the lower priority given to OSH agenda by Timber and Wood Workers Union will contribute substantially to WPI's neglect of workers health and safety.

A machine without safety guard for the blade

**Figure 4.4: Machine without safety gadgets**


**Figure 4.4.2: Machine without safety gadgets**


**Figure 4.4.3: Machine without safety gadgets**

# CHAPTER FIVE

# CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Introduction

The study assessed the occupational health and safety practices at the wood village at Sokoban in the Ashanti Region of Ghana. This provides the conclusions and recommendations to the study.

## 5.2 Conclusions

From the results of the study on occupational health and safety practices at Sokoban wood village in the Ashanti Region of Ghana it could be concluded that:

The result of this study suggests that the respondents were not ignorant of the need for safety practice in the various aspects of their work. That notwithstanding they need to be given more education on issues of occupational health and safety as technology keeps on changing.

Furthermore, the respondents generally indicated that they regularly use personal safety equipment for their. This is quite encouraging. However, they should be motivated to regularly use it. Additionally, the worker indicated that there were provided with personal protective equipment/gargets for their daily work. The study further confirmed by majority of the respondents that most of the woodwork machines used at the wood village were without safety gargets. It therefore, important that owners of these machines are encouraged to provide safety gargets on their machines.

## 5.3 Recommendations

Based on the findings of the study, the followings recommendations are suggested;

- It is recommended that further studies should be conducted to cover infections and diseases related to wood processing in the wood industry and all aspects of health and safety.

- The use of safety and health equipment/gargets should be encouraged at the Sokoban wood Village. This is because that is the cause of most accidents among wood workers.
- All appropriate safety garget should be put on machines to ensure safety of operators.
- The management of Sokoban wood village should put strict measures in place that no employee is allowed to enter the production area or yard without his or her PPE.
- There should be regular organization of training and refresher courses at the work place for both new recruits and regular workers. This will help eliminate most of the dangers and hazards associated to wood processing.
- The study again recommends that there should be fully furnished clinic facility at the Sokoban wood village to provide first aid to injured workers and treat other minor cases of health and safety.

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# APPENDIX

## UNIVERSITY OF EDUCATION, WINNEBA

## COLLEGE OF TECHNOLOGY EDUCATION - KUMASI

## QUESTIONNAIRE FOR OPERATORS / MILL ATTENDANTS

I am student of University of Education Winneba, Kumasi-Campus. This questionnaire is intended for a research to investigate into the problem with wood processing work. The information needed is academic purpose and confidentiality is guaranteed.

**Please, indicate by ticking (✓) the appropriate box where applicable.**

**Part One: Personal Data**

1. Gender: Male ( ) Female ( )
2. How long have you been doing this work

a) Below 1 year ( ) b) 1-5 years ( ) c) 6-10 year d) 10 years and above

3. What is your level of education?

a) No non formal education ( ) b) M.S.L.C / J.H.S ( )

c) S.S.S.C.E / G.C.E.O Level ( ) d) H.N.D / A Level ( )

4. What operations are you doing?

a) Sawing ( ) b) Planning ( ) c) Molding ( ) d) Sanding ( )

e) Boring ( )

5. What is the work force of your establishment?

a) 1-10 ( ) b) 11-20 ( ) c) 21-30 ( ) d) 31-40 ( ) e) More than 40 ( )

6. What is the total work force of this establishment?

a) Less than 5( ) b) From 6-10 ( ) c) From 11-20( )

d) More than 40 ( )

**Part Two: Awareness of safety by wood workers at wood village**

This part of the questionnaire is to assess the awareness of safety practices by wood workers.

Please place a check mark (✓) in the appropriate column.

| Item # | Question | Place a Check Mark (✓) in the appropriate column | | | | | |
|---|---|---|---|---|---|---|---|
| | | Do Not Know | Never | Rarely | Sometimes | Usually | Always |
| | **A. Personal protective equipment** | | | | | | |
| 7 | Wood workers need gloves, or mittens | | | | | | |
| 8 | Wood workers need overall | | | | | | |
| 9 | Wood workers need safety boot | | | | | | |
| 10 | Wood workers need googles | | | | | | |
| 11 | Wood workers need face shield | | | | | | |
| 12 | Wood workers need nose or mouth mask | | | | | | |
| 13 | Wood workers need earplugs or ear muffs | | | | | | |
| 14 | Wood workers need helmet | | | | | | |
| | **B. Machines** | | | | | | |
| 15 | Machine guards and fences need to be in place before using it | | | | | | |

| | |
|---|---|
| 16 | Only trained personnel need to operate the machines |
| 17 | Electrical gadgets should be put off before leaving the plant |
| 18 | Woodworkers should adhere to machine safety rules |
| | **C. Work environment (pollutant)** |
| 19 | Ventilation at the wood processing plant needs to be adequate |
| 20 | Noise at wood processing plant need to be within acceptable level. |
| 21 | Adequate dust harvesters is needed at the processing plant |
| 22 | Adequate lighting is needed at the work place |
| 23 | Excessive heat in your workspace should be avoided |

**D. Training**

| | |
|---|---|
| 24 | On-the-job training is needed for new employees |
| 25 | Woodworkers need to attend frequently safety workshops |

**E. Health**

| | |
|---|---|
| 26 | Medical care scheme is needed for all workers |
| 27 | Wood processing could lead to skin irritation / dermatitis |
| 28 | Wood processing could lead to nausea |
| 29 | Wood processing could lead to lack of appetite |
| 30 | Wood processing could lead to constant headaches |
| 31 | Wood processing could lead to hearing loss |
| 32 | Wood processing could lead to Minor injury (e.g. Cuts, waist pain, irritation of eye etc.) |
| 33 | Wood processing could lead to major injury (e.g. amputation of arm) |

**Part Three: The use of safety practices for work**

This questionnaire is design to assess the practice of safety at the work place. Answer each question to the best of your knowledge. Please place a check mark (✓) in the appropriate column.

| Item # | Question | Never | Rarely | Sometimes | Usually | Always |
|---|---|---|---|---|---|---|
| | **Personal protective equipment** | | | | | |
| 34 | Do you wear gloves / mittens when working | | | | | |
| 35 | Do you wear overall when working | | | | | |
| 36 | Do you wear goggles when working | | | | | |
| 37 | Do you wear face shield when working | | | | | |
| 38 | Do you wear nose and mouth mask when working | | | | | |
| 39 | Do you wear earplugs or ear muffs when working | | | | | |
| 40 | Do you wear helmet when working | | | | | |
| | **MACHINES AND MAINTENANCE** | | | | | |
| 41 | Do you ensure that guards and fence are place when machines are to be use | | | | | |

| | |
|---|---|
| 42 | Do you ensure that trained personnel operate the machine |
| 43 | Do you ensure that electrical gadget are put off before they leave the plant |
| 44 | Do you ensure that they adhere safety rules |
| 45 | Do you ensure that they maintain and repairs machines |
| 46 | Do you ensure that saws are adequately conditioned |
| 47 | Do you ensure that worn out chains and ropes are changed |

**Part Four: Safety gargets put in place for machines users**

This questionnaire is design to identify the safety gargets put in place for woodworkers in sawmilling industry at wood village. Please place a check mark (✓) in the appropriate column.

| Item # | Question | Exist | Does not exist | Improvised |
|---|---|---|---|---|
| | **BORING / MORTISING** | | | |
| 48 | A guard enclosing the bit and the chuck. | | | |
| 49 | Enclosement of the cutting chain and driving mechanism. | | | |
| 50 | emergency stop switch | | | |
| 51 | Safety chain to anchor or bold counter weight from dropping | | | |
| 52 | Inverted U-shaped guard that covers Operating treadles | | | |
| 53 | Operators manual to guide operation of machine | | | |
| | **MOLDING MACHINE** | | | |
| 54 | The belts and pulleys completely enclosed with sheet metal or heavy mesh guards | | | |
| 55 | Cutter head covered with metal guard or cage | | | |

| | |
|---|---|
| 56 | guard feet rolls with wide metals strip or bars that allow boards to pass |
| 57 | Safety shield |
| 58 | Anti-kickbacks fingers installed in the in-feet site across the width of the machine |
| 59 | Operators manual to guide operation of machine |
| 60 | Wood clamp |
| 61 | Power transmission devices enclosed |

**SANDING MACHINE**

| | |
|---|---|
| 62 | Guard feed rollers with a semi cylindrical guard to prevent contact with in-running rolls |
| 63 | A guard on the unused run of the sanding belt against accidental contact to prevent the operators hands or fingers from contact with the nip ends |
| 64 | Guard to enclose drum and disc sanders |
| 65 | Fixed guards enclosing power |

transmission pulleys

66 Operators manual to guide operation machine

**PLANNER**

67 operators manual to guide the operation of the machine

68 Cutter head enclosed with an automatic guard or cage

69 stick to push work pieces that are short

70 Sheet metal or heavy mesh guard to enclose belt and pulleys

71 Guard feet rollers with a wide metal strip or bar that allow boards to pass

72 Provide barriers at the loading and unloading ends to keep hands out of point of operation

73 Power transmission system enclosed

**SAWING MACHINE (BAND SAW)**

74 operators manual to guide the operation of the machine

| | |
|---|---|
| 75 | Adjustable metal top guard to provide a barrier for the blade except at the point of operation |
| 76 | emergency power switch |
| 77 | Pulley mechanisms fully enclosed with guard |
| 78 | Installation of break on one or both wheels to minimize the potential of coasting after the saw has been shut off. |
| 79 | Tension control device to protect the blade from breaking |
| | **CIRCULAR SAW** |
| 80 | Operators manual to guide operation of machine |
| 81 | A guide for the belt and pulley |
| 82 | An anti-kick back device |
| 83 | A blade guard |
| 84 | An emergency off/on switch |

**Part Five: Effect of wood processing and the health implication on the wood worker at wood village**

This questionnaire is design to identify the effects of wood processing on the health of the woodworker at wood village. Please place a check mark (✓) in the appropriate column.

| Item # | Question | Never | Rarely | Sometimes | Usually | Always |
|---|---|---|---|---|---|---|
| | **EXPOSURE TO SAWDUST** | | | | | |
| 82 | I do report skin irritation / dermatitis | | | | | |
| 83 | I do report headaches | | | | | |
| 84 | I do report nausea | | | | | |
| 85 | I do report eye irritation | | | | | |
| 86 | I do report respiratory problems | | | | | |
| 87 | I do report lack of appetite | | | | | |
| | **EXPOSURE TO CUTTING SHARP EDGE** | | | | | |
| 88 | I do report small cuts | | | | | |
| 89 | I do report amputated arm | | | | | |
| | **OTHER INJURIES DUE TO NOISE / POOR VENTILATION** | | | | | |
| 90 | I do report hearing loss | | | | | |
| 91 | I do report poor eye sight | | | | | |