DETERMINANTS OF OCCUPATIONAL INJURIES AMONG WORKERS IN ACCRA BREWERY LIMITED, GREATER ACCRA REGION, GHANA.

BY

BERNICE OWUSU ANSOMAA

(10386763)

THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF PUBLIC HEALTH DEGREE.

JULY 2019.
DECLARATION

This dissertation is submitted to the College of Health Science of the School of Public Health, University of Ghana, in partial fulfillment of the requirement for the award of the Master of Public Health degree. I, BERNICE OWUSU ANSOMAA, hereby declare that with the exception of references and quotations from other sources which have all been duly acknowledged, the study on “DETERMINANTS OF OCCUPATIONAL INJURIES AMONG WORKERS IN ACCRA BREWERY LIMITED is my independent work and under the supervision of DR. URI SELORM MARKAKPO, and it has not been submitted either in part or whole for any other degree elsewhere.

Signed …………………………………. Date …………………………………

BERNICE OWUSU ANSOMAA
(Student)

Signed …………………………………. Date …………………………………

DR. URI S. MARKAKPO
(Supervisor)
DEDICATION

I dedicate this dissertation to my beloved mum Agnes Owusua and the entire family.
ACKNOWLEDGEMENT

I cannot find words to express my gratitude to God for his care and protection throughout this programme. Further appreciation goes to my supervisor Dr. Uri Markakpo Selorm who has immensely been helpful throughout each phase of this dissertation. A special thanks goes to my mother, Madam Agnes Owusu whose prayers and encouragement kept me going whenever I encountered challenges in this academic journey. A special appreciation also goes to Mr. Emmanuel Agyekum, the Safety manager and the entire staff and management of Accra Brewery Limited for their reception and giving me access to their facility to conduct this study.
ABSTRACT

BACKGROUND: Worldwide, occupational injuries have become an important public health issue leading to greater economic burden for a country. The Brewing Industry remains a very important industry that contributes greatly to the socioeconomic development of the country. The International Labour Organization (ILO) estimates that about 2.3 million fatalities annually occur from involuntary occupational injuries and diseases. Even though several efforts have been put in place to minimize occupational injuries among industry workers including those of the brewery industries, not much has been done in Ghana.

OBJECTIVES: The main purpose of this study was to assess the determinants of occupational injuries among workers of the Accra Brewery, Limited in Ghana

METHOD: A descriptive cross-sectional design was employed in this study. A total of 158 participants were randomly selected from the staff of ABL to be part of the study. Departments were used as strata in execution of stratified sampling technique. Pretested semi-structured questionnaires and an observational checklist was used to obtain information from eligible participants and work environment. Data were edited and statistically analyzed using Statistical Package for the Social Sciences (SPSS) version 22. Chi square test of independence and Logistic regression were used to test the relationship between the categorical variables and occupational injuries.

RESULTS: The study outcome revealed that educational level (OR = 0.10, 95% CI: 0.03-0.29, p-value = 0.000), OSH training (OR= 0.23, 95% CI:0.09-0.57, p-value = 0.002), PPE compliance (OR= 5.96, 95% CI:1.17-20.75, p-value = 0.005) and cause of injury(OR= 0.49, 95% CI:0.34-0.69, p-value = 0.000) were significantly associated with occupational injuries.
CONCLUSION

Young age, job category, lack of experience, low educational level increased the risk of occupational injuries. Working for 40 hours or more, inadequate training, job dissatisfaction increased the occurrence of occupational injuries. Adequate occupational health and safety training, workload reduction, employee’s motivation and strict enforcement of PPEs usage should be implemented.
TABLE OF CONTENTS

DEDICATION ........................................................................................................................... ii
ACKNOWLEDGEMENT ........................................................................................................ iii
ABSTRACT ........................................................................................................................... iv
TABLE OF CONTENTS ......................................................................................................... vi
LIST OF TABLES ................................................................................................................... vi
LIST OF FIGURES ............................................................................................................... x
DEFINITION OF TERMS ..................................................................................................... xiii

CHAPTER ONE ...................................................................................................................... 1
1.0. INTRODUCTION ............................................................................................................. 1
  1.2 Problem Statement ...................................................................................................... 3
  1.3 Significance of the Study ............................................................................................ 4
  1.4 Objectives ................................................................................................................... 5
      1.4.1. Main Objective ................................................................................................... 5
  1.4.2. Specific Objectives: ............................................................................................. 5
  1.5. Research Questions .................................................................................................. 5
  1.6. Conceptual Framework ............................................................................................ 6

2.0 LITERATURE REVIEW .................................................................................................. 8
  2.1 The Brewing Industry in Ghana ................................................................................ 8
  2.2 Socio-demographic Factors that Contribute to Occupational Injuries among 
      Brewery Workers ........................................................................................................ 9
  2.3 Occupational Health, Safety and Accidents ............................................................ 10
  2.4. Work environment factors related to occupational injuries .................................... 11
      2.4.1. Risk factors related to occupational injuries .................................................. 11
      2.4.2 Manual Handling .............................................................................................. 12
      2.4.3 Carbon Dioxide and Other Hazardous Gases ................................................ 12
      2.4.4 Working in Extreme Temperatures .................................................................... 12
      2.4.5 Noise Hazard .................................................................................................. 13
  2.5 Safe Work Practices ................................................................................................... 13
  2.6 Types of Occupational Hazards ................................................................................ 14
      2.6.1 Safety Hazards .................................................................................................. 15
      2.6.2 Biological Hazards ............................................................................................ 15
      2.6.3 Physical Hazards ............................................................................................... 16
      2.6.4 Ergonomic Hazards .......................................................................................... 16
      2.6.5 Chemical Hazards ............................................................................................. 16
      2.6.6 Psychosocial Hazards ....................................................................................... 17
  2.7. Health Implications of Workplace Hazards ............................................................ 17
Appendix B: Observation Checklist ................................................................. 59
Appendix C: Ethical Approval Form ................................................................. 60
LIST OF TABLES
Table 3.1 Number of people sampled from each Department ........................................... 25
Table 4.2 Socio-demographic characteristics of the study participants ...................... 30
Table 4.3 Test of association between Independent Variables and Occurrence of Occupational Injury among Respondents ................................................................. 33
........................................................................................................................................ 33
Table 4.3.1 Omnibus Tests of Model Coefficients ............................................................... 35
Table 4.3.2 Model Summary ................................................................................................ 36
Table 4.3.3 Prediction of Occupational Injuries among Respondents Based on Independent Variables .............................................................................................................. 35
Table 4.2.4 Logistics Regression of Occupation Injuries on the study variables ......... 36
LIST OF FIGURES

Figure 1.0 Conceptual Frame Work of Determinants of Occupational Injuries.............7
Figure 2 Map of Location of Accra Brewery Limited..................................................21
Figure 3.0 Distribution of cause of injury...................................................................35
Figure 4.0 Distribution of affected body parts............................................................36
KEYWORDS: Brewery, Personal Protection Equipment, Determinants, Health and Safety
**LIST OF ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABL</td>
<td>Accra Brewery Limited</td>
</tr>
<tr>
<td>AB InBev</td>
<td>Anheuser-Busch InBev SA/NV</td>
</tr>
<tr>
<td>HPD</td>
<td>Hearing Protection Device</td>
</tr>
<tr>
<td>HSE</td>
<td>Health and Safety Executive</td>
</tr>
<tr>
<td>ILO</td>
<td>International Labour Organization</td>
</tr>
<tr>
<td>OSH</td>
<td>Occupational Safety and Health</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Administration</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>SOPs</td>
<td>Standard Operating Procedures</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for the Social Sciences</td>
</tr>
<tr>
<td>GHS</td>
<td>Ghana Health Service</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>ILO</td>
<td>International Labor Organization</td>
</tr>
</tbody>
</table>
DEFINITION OF TERMS

**Occupational Injury:** is any personal injury, disease or death resulting from an occupational injury.

**Occupational Disease:** is any chronic ailment that occurs as a result of occupational activity.

**Personal Protective Equipment:** is an equipment or clothing designed to protect workers from hazards when on a worksite.

**Safe work practices:** are protocols that consist of what you should do and should not do in order to prevent injury to oneself or other workers.
CHAPTER ONE
1.0. INTRODUCTION

1.1 Background

Safety at the workplace is a major contributor to the health of workers. In an era of increasing modernization and urbanization, workers tend to spend at least eight hours a day at their workplace. Work environment should therefore be free of occupational hazards in order to assure workers’ safety and health. Occupational injuries remain an important unresolved issue in many countries and are very common in developing countries (Mekkodathil, El-Menyar, & Al-Thani, 2016).

The brewing industry continues to be an important sector of the Ghanaian economy contributing to foreign exchange, employment and socioeconomic development for many years. Industrial injury-frequency rates for breweries, as compiled by the Bureau of Labor Statistics, indicates that injuries constitute a major problem in this industry. The current trend of brewing operations are characterized by exposure to hazards including heat, dust, noise, dangerous machines and toxic chemicals which results in a significant burden of occupational injuries.

Accra Brewery Limited engages in the manufacture and supply of beer and non-alcoholic beverages primarily in Ghana. It is the principal subsidiary of Anheuser-Busch InBev SA/NV (AB InBev), a major brewery headquartered in Leuven, Belgium. As pertains in many other industries, workers in the brewery industry stand at an equal risk of being involved in an occupational injury because of the job they do. The main risks they are exposed to include; manual handling especially handling of kegs and crates of beer; slips and trips, injury from moving objects, falls - especially from vehicles, stairs, ladders and work platforms; and vehicles - especially fork-lift trucks. Other hazards include dust, chemical, biological agents and unfavourable working conditions like high temperatures (WHO, 2010).

1
Evidence from journals have indicated an increment in the number of occupational injuries among factory workers in the brewery industry. Occupational hazards and risks faced by these workers includes noise exposure and dangerous substances, manual handling and handling of potentially dangerous machinery. Brewery staff are faced with a lot of challenges in the prevention and control of occupational injuries and hazards especially in developing countries. Injuries in the brewery just like any occupational injury may lead to deaths, disabilities and financial losses.

According to Magauzi et al., (2011) and Siziya et al., (2012), the approximated number of occupational injuries and sicknesses is about 250 million per annum globally. Studies on occupational injuries and illnesses in Ghana, Nigeria, Zambia, Botswana and Zimbabwe revealed high prevalence of it in Africa (Steen et al., 1997; Birabi, Dienye, & Ndukwu, 2012).

In Ghana, occupational injuries have been reported to result in higher fatality rate, longer disability, and higher cost of treatment than non-occupational injuries (Mock, Agyei, Acheampong, & Simpson, 2005). Though, there seem to be an increase in the number of occupational injuries and illnesses reported, the data from relevant government agencies cannot fully be trusted as result of poor reporting (Eroke, 2013; W H O, 1998). In Ghana, workers in the brewery industry also suffer a lot of occupational injuries and illnesses but data on the industry cannot be accessed.
1.2 Problem Statement

According to International Labour Organisation (ILO), (2005), occupational injuries are defined as any trauma, harm, disease or death sustained by a person during an occupational accident (Nelson et al., 2005). Brewery employees are exposed to physically related risks which are typically attributed to job-related factors (Bull, Riise, & Moen, 2002).

Workers in ABL are exposed to several hazards in the course of work including manual handling, inhalable dust, noise and injury from heavy plant and machinery, extremes of temperature, as well as slip, trip and falls. The workers normally load or offload trucks manually; most of these workers are paid according to the number of trucks offloaded. As a result, there is a risk of workers straining themselves by working for long hours in order to increase their daily earnings. Most of the processing plants and machines such as bottle fillers are known to produce noise levels as high as 85 dB(A) even though Occupational Health and Safety Administration (EU-OSHA) recommend below 85dB(A). Exposure to manual handling, inhalable dust and noise may lead to musculoskeletal disorders, acute respiratory disorders and hearing impairment respectively.

According to EU-OSHA, (2007), factory workers are expected to be trained on safe work practices, for example, identification and control of occupational hazards yet this has not been always the case for workers at ABL. Additionally, all factory workers are expected to observe safety protocols in their daily work schedule but in some cases this has not been so as workers had been seen operating machines without guards or working without appropriate PPEs.

Currently, the emerging trends show a high number of reportable occupational injuries and illnesses at ABL, a setting where injuries involving employees probably go unreported. Identification of factors that lead to injuries among ABL workers therefore, would help institute measures required to minimize occurrence of injuries among them.
Furthermore, studies on occupational risk behaviors in Ghana have largely neglected the brewery industry even though the nature of their job expose them to greater risk of occupational injuries. Therefore, this study was necessary to generate data required to improve policy on occupational health and safety among workers of breweries in the country.

1.3 Significance of the Study

The aim of the management of ABL is to optimise productivity from both equipment and labour force in order to obtain maximum profits. However, there are a number of work-related risks impacting on both permanent and contracted employees which could potentially lead to decreased employee productivity. The Occupational Safety and Health Act (2007) and related supplementary legislation state that “it is the employer’s obligation to provide a safe working environment for the workers”. These regulations also spelt out that it is the responsibility of the employer to divulge accident statistics and to keep proper records. An employee must be made aware of the hazards that are imminent in the job. These Acts further demand that this material should be posted in prominent sites where all employees can access. There is the need for employee to partake in planning, monitoring and maintenance of safety systems.

Therefore, data from this study would serve as a resource material needed to educate, inspire and persuade ABL workers towards use of safety protocols, equipment and standard operating procedures in order to ensure health and safety of people at the workplace.

Conduct of this study would also help devise measures to prevent and/or control occupational injuries among workers of ABL. Finally, conduct of this study would help improve health and safety of workers of ABL with a view to increasing productivity and improving the conditions of service for these workers.
1.4 Objectives

1.4.1. Main Objective
The main objective of this study was to assess the determinants of occupational injury among workers of Accra Brewery Limited.

1.4.2. Specific Objectives:
The specific objectives of the study are as follows;

- To determine the proportion of ABL workers who have sustained injury at the workplace.
- To assess the type of occupational health and safety measures in place at Accra Brewery Limited.
- To identify the factors that are associated with occupational injuries among the workers of the Accra Brewery Limited

1.5. Research Questions
This study sought to answer the following research questions:

- What proportion of ABL workers have sustained injury at the workplace?
- What factors are associated with occupational injuries among the workers of the Accra Brewery Limited?
- What occupational health and safety measures are in place to minimize occupational injuries among the workers?
1.6. Conceptual Framework

The conceptual framework (Fig 1) describes how certain factors (independent variables) may lead to the occurrence of occupational injuries (dependent variable). The framework attempts to explain the influence of various risk factors on the occurrence of occupational injuries. The risk of an employee being exposed to an injury may be influenced directly or indirectly by the following factors: social and demographic factors, work environment and ergonomic factors, worker’s behavioural factors and worker’s knowledge about occupational injuries.

For example, older employees tend to have more experience and have higher tendency to observe safety precautions and are therefore less likely to be injured compared to younger aged employees. In addition, workers with high level of education have higher ability to read and understand safety protocols and are therefore more likely to observe safety precautions and avoid injuries than the less educated counterparts.

Failing to take a break may be another common cause of occupational injury. In order to recover from gruelling manual labour, it is essential that employees take adequate breaks. Not doing so can lead to a slew of physical issues including atrophy and general exhaustion. Socioeconomic and demographic factors such as educational level, age, employment status and income are various risk factors of occupational injuries. Employees with low level of education may be prone to occupational injuries.
1.7 Conceptual Framework

**Knowledge about Occupational Hazards**
- Appropriate use of PPEs.
- Awareness of OSH policies
- Management of injuries
- Reporting injuries
- Use of protocols

**Socio-demographic factors**
- Age
- Sex
- Health status
- Marital Problems
- Monthly Income
- Employment pattern
- Work experience

**Work Environment and Ergonomic Factors**
- Health and safety training,
- health and safety supervision, hours worked per week, working department,
- manual handling, visual concentration needed for the task, use of vibrating tools,
- safely guarding of machine, and timely maintenance
- Lifting

**Worker Behavioral Determinants**
- Sleeping problems
- Use of personal protective equipment
- Fatigue

---

*Figure 1.0 Conceptual Framework of Determinants of Occupational Injuries*
CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 The Brewing Industry in Ghana

Historically the brewery industry in Ghana has been a local industry with very few companies having substantial international presence. However, the last couple of decades have seen increasing consolidation with the industry leading to emergence of global multinationals. In Ghana some of the players in the brewery industry includes the Kasapreko company ltd, Agya Appiah company Ltd, Obibini Blackman distillery, Guinness Ghana Brewery Ltd (GGBL), ABL, etc. The two leading brands of alcoholic beverage production are ABL and GGBL. ABL is a subsidiary of Anheuser-Busch InBev (ABInBev). They have an annual installed capacity of 700,000 hectoliters. They are the producers of the number one selling beer brand in Ghana that is the Club Beer. A close competitor in the industry is Guinness Ghana Brewery PLC wish was established in 1960. It is listed on the Ghana Stock exchange. They are the producers of Ghana’s number one stout Guinness. They are also known for brands such as Star Beer, ABC beer, Origin, Malta Guinness, Smirnoff etc. The alcoholic industry provides employment and income generations for a lot of families. They are a subsidiary of Diageo PLC.

To produce alcoholic drinks in the brewery industry, cereal grains are steeped in water and then fermented with yeast and then matured and decanted producing ethanol liquor (Boulton, 2013). These industries are classified as food industries therefore laws and regulations governing food industries are also applicable (Mugabe, 2012). In Europe the brewers are ethically and legally expected to ensure safe and wholesome products for consumers and guarantee food safety along the supply chain (Pacala, O, Begea, & Sirbu, 2009). Though beer is characteristically a safe product it can be contaminated by foreign materials and chemicals during the manufacturing and supply processes. According to the dangerous Substances Explosive Atmospheres Regulations, there is a need for a systematic hazard and risk assessment to ensure
personnel and the public are not at risk from fire and explosion at the brewery (Northumbria University, 2002).

Heineken, (2019) reported that despite the various safety measures in place at their various factories around the world, in 2018 there was about 1000 accidents and 24 fatalities. This was an 18 percent improvement from the year 2015.

2.2 Socio-demographic Factors that Contribute to Occupational Injuries among Brewery Workers

Various studies from the U.S, France and China shows that males are at a greater risk of occupational injuries than females Bhattacherjee et al., (2003), explained that these difference is attributed to variation in job assignments even for similar job categories and probably their perception of risk and behaviour. However, Fulle, (1988) concluded that gender had no relationship with the incidence of work related injury when a study was undertaken in eleven urban industries and textile factories in Ethiopia.

Health behaviours of employees have been shown to cause work-related injuries. Several research works indicates that smokers are prone to occupational injury as compared to non-smokers (Chau et al., 2004). Abuse of substances such as alcohol, marijuana and others have also been connected with increased occupational accidents resulting in injuries, with studies showing a dose-response relationship (Shipp, Tortolero, Cooper, Baumler, & Weller, 2005). A study amongst workers between the age brackets of 25-30 in the USA revealed that substance abusers were also had a double change of suffering from occupational injuries as compared to non-substance abusers (Pollack, Franklin, Fulton-Kehoe, & Chowdhury, 1998).

Kim et al., (2014) in observed that as workers education and income levels improved, their risk to occupational injury reduced when they studied the Korean workforce. They also concluded in their study that workers involved physical works were more prone to injury than their white colour colleagues.
2.3 Occupational Health, Safety and Accidents

Many scholars have given various definitions of Occupational health and safety concept; (Buck, 2009) for instance gave the definition of it as the protection of employees in their work environment from dangers ensuing from factors adverse to their health.

Alfers (2010) also defined it as the placing and maintenance of the worker in an occupational environment adapted to his or her physiological and psychological capabilities. Though in most cases, occupational health and safety (OHS) concentrates more on negative outcomes such as occupational injury and sickness, the absence or low incidence of injury does not necessarily correspond to adequate safety systems and controls in place (Nyamekye et al., 2009).

The ILO Convention No. 161 on Occupational Health Services, the World Health Organization (WHO) Global Strategy on Occupational Health for All, and the WHO Global Plan of Action for Workers’ Health, 2008-2017, call for the organization of occupational health services to every worker in the world. The purpose of occupational health will be to ensure that the highest level of mental, physical and social wellbeing for workers of every background is promoted and maintained. Thus preventing working conditions that adversely affect the health of employees both physiologically and psychologically (WHO; World Health Organization, 1995).

Lund & Marriot, (2005) postulated safety as what is involved in the protection of people from physical injury. Safety as defined by Rockström et al., (2009) and International Labour Organisation (ILO) (2015) states that it is the science of anticipation, recognition, evaluation and control of hazards arising in or from the work environment that could blight the health and well-being of employees, taking into cognizance the likely impact on the surrounding communities and the general environment. Safety therefore can be said to be aimed at maintaining and promoting the highest level of physiological, psychological and social wellbeing of employees in any job environment (Towers, 2004)
The work environment is associated with variety of risks which causes accidents and injuries. Maintenance of occupational health and safety involve a multitude of factors which ranges from Ergonomics, Physics, Chemistry, economics and toxicology. Employee understanding of occupational health and safety has been demonstrated to help prevent or minimize these avoidable accidents (Wong & Chan, 2018).

Many organizations aim to maximize output as against prioritizing employee health. In recent times however there is a growing awareness that companies perform better financially when they invest in employees’ health and well-being (Goetzel, Guindon, Turshen, & Ozminkowski, 2001). Organizations are therefore now placing health and safety issues are the fore front of work and organizational design. There has been an increasing number of publications looking at interventions aimed at improving or preventing occupational accidents and injury (Miller, Hoskin, & Yalung-Mathews, 1987) and (Nui, 2000).

The cost of recruiting, training, motivating and maintaining new employees to take over from experienced staff lost through illness, injuries or fatalities caused by unsafe and unhealthy conditions at the cannot be estimated (Amponsah-Tawiah & Dartey-Baah, 2011). Organizations thus, can no longer run on the assumption that manpower is expendable expandable (Takala, 2000) and therefore cannot afford to lose personnel and replace them in a short period. This point is also relevant for the operations of artisans in the vehicle repairs and spare parts retail business; since they are self-employed occupational hazards and risks, they experience become a threat to the survival of their business.

2.4. Work environment factors related to occupational injuries

2.4.1. Risk factors related to occupational injuries

The burden of occupational injuries on global health cannot be ignored, it is reported that a worldwide estimate of 100 million work-related injuries occur annually. The actual number might be significantly high due to evidence of underreporting observed (Nelson D I et al.,
2005). It was reported that in 2007 alone, the USA recorded an estimated 8,559,000 nonfatal work-related injuries which cost them about occurred with associated costs totaling $186 billion (Leigh, 2011).

A relationship between certain risk factors and work-related injuries have been established by a number of studies and possible mechanism for such links have been suggested. These risk factors have been highlighted below;

2.4.2 Manual Handling

Manual handling causes the highest number of injuries in the brewery industry (Eustace, 2011). Manual handling activities include lifting, pushing, pulling, swinging, holding, restraining and carrying. It also includes repetitive tasks such as packing, typing, assembling, cleaning and sorting, using hand-tools, operating machinery and equipment, and handling. Manual handling accounts for most of the injuries in breweries. The best way to prevent these type of accidents and injuries will be to provide non-slip surfaces, proper footwear, and a system of cleaning (Jeanne, 2007).

2.4.3 Carbon Dioxide and Other Hazardous Gases

Carbon dioxide (CO₂) is produced during the fermentation process, if CO₂ is above 10% is inhaled even for a short time, it can result in asphyxia, unconsciousness, and even death. There is therefore the need for an efficient ventilation system in all fermenting chambers with also acoustic warning systems; which sends out warning signals as soon as the ventilation system malfunctions (Jeanne, 2007). There is also the need for safety precautions against explosion in the chamber (Olsen, 2012).

2.4.4 Working in Extreme Temperatures

Certain activities in the brewery industry exposes workers to humid and hot conditions whiles undertaking difficult tasks. This can result in heat cramps and heat strokes especially amongst inexperienced workers. Severe injuries sometimes occur when exposed to hot-water, steam-
lines and processing equipment. Safety locks on valves, lagging and shielding of steam pipes must be provided (Johnstone, Quinlan, & Walters, 2005).

The hands, arms and face are the body parts mostly affected by burns. These situation can be avoided by strictly following safety work procedures and availability and usage of appropriate PPE (Muchemi, 2013; Piombino, 2005).

2.4.5 Noise Hazard

Noise can result the distraction of concentration (Concha-Barrientos et al., 2004),(Smith, 1990) increase fatigue and extend reaction time (Kjellberg, Muhr, & Skoldstrom, 1998), and minimize capability to hear warnings signals or other important messages (Morata et al., 2005), which are all contributory factors to occupational accidents and injuries. There has been suggestions that high frequency noise exposure may increase the risk of falls and slips especially for workers at height as a result of possible disruption in vestibular system triggering postural stray (Park, Lee, Lockhart, & Kim, 2011). Certain automated bottling systems produce appreciable noise. The replacement of metal rollers and guides with nylon neoprene may considerably minimize the level of the noise (Jeanne, 2007)

2.5 Safe Work Practices

A general program which addresses the various aspects of OSH is crucial to the improvement of overall organizational performance. In particular specific focus should be given to hazard mitigation programs which commonly include; use and selection of PPE, safe work procedures for high risk tasks such as entry into confined spaces, isolation of energy sources and dangerous parts of machinery, identification and communication of hazardous chemicals, self-inspection programs, hearing conservation programs, the control of infectious materials, process management and emergency response programs.

When workers are well trained in safe work practices, it reduces their exposure to harmful conditions and injuries (Jeanne, 2007). Employers are duty bound to provide and enforce the
use of PPE in the workplace. PPE includes items such as safety helmets, Boots, gloves, goggles, visibility clothing, harness, etc. They are intended to protected users against work-related health and safety risks (Health Safety and Environment (HSE)), 2006)

Additionally, there are a lot of risks associated with a dynamic and changing environment, which presents challenges and opportunities workers, authorities and the whole organization. Potential conditions expose workers to occupational injuries should be eliminated by detecting the elements that affect risk-taking behavior, physical and psychological health of employees

**2.6 Types of Occupational Hazards**

In order to effectively design and implement an occupational health and management system, there is the need to appreciate the different types of hazards available in the work environment and ways to identify them (MacKay, Cousins, Kelly, Lee, & McCAIG, 2004). The main purpose of any safety strategy must be to minimise hazard and risks to levels below which can result in an injury (MacKay et al., 2004). Hazards indicates the capability to cause harm, whether or not this harm happens depends on certain factors such as; level of exposure, length of exposure, toxicity of the hazard (MacKay et al., 2004). Theoretical evidence relating hazards to harm through risk factors abound (Chandola et al., 2008); (McEwen, 2000); (Sapolsky, 2003). There is therefore the need to understand the basic concepts of hazards, risks and harm. Hazard are those conditions at the workplace either physical, psychological or both, with the capability to cause accidents or unwanted consequences. It is an innate property of a substance, energy source or condition capable causing substantial damage, for instance unguarded machinery, slippery floor, etc. (Ministry of Health/Ghana Health Service, 2010).

Occupational harm can be defined as the type and nature of impact of conditions and factors at the workplace on worker’s health. Harm can either be physical or psychological and the outcome may either be chronic or acute. McEwen (2000) postulated that the physical or psychological outcomes of stress in the workspace may have similar psychological pathways.
Harm does not affect only the individual but the organization, in the form of absence due to illness, mistakes and performance retardation.

The concept of risk is the probability that an exposure to a hazardous condition will result in a harm. (Ministry of Health/Ghana Health Service, 2010) referred to risk as “The probability that damage to life, health and/or the environment will occur as result of a given hazard”. The probability of ill health or injury happening does not only depend on the innate nature of the hazard but also on the preventive measures in place to minimize or eliminate the hazard. The major types of occupational hazard found in literature are summarized below.

2.6.1 Safety Hazards

This is the commonest type of hazard in most work environment. Safety hazard refers to dangerous conditions which can result in sickness, injury or fatality. Examples of these type of hazard includes slippery floor, cords running loosely on the floor, lives wires hanging loosely around, blocked aisles, unguarded turning machine parts, pallets lying haphazardly, etc.

2.6.2 Biological Hazards

These types of hazards are mainly experienced by workers dealing with animals, humans or infectious plant materials. Work environments such as schools, laboratories, hospitals, nursing homes, etc. may expose people to these types of hazard. Exposure to blood and other body fluids, bacterial, viruses, fungi, plants, insect bites, animal and bird droppings might result in biological hazard.
2.6.3 Physical Hazards

Physical hazards are common injury source in a lot of industries (International Labour Organisation (ILO)), 2010 #601). These are agents in the work environment that can harm with or without contact. Examples of physical hazards include ergonomic hazards, radiation, heat and cold stress, vibration and noise hazards.

2.6.4 Ergonomic Hazards

Ergonomic hazard may be defined as the conditions at the workplace that pose injury risk to the musculoskeletal system University of Chicago, (2010), such as muscle or ligaments of the lower back, tendon or nerves of the hands or wrist or bones surrounding the knees. Ergonomic hazards are difficult to spot because it is impossible to always spot a strain on your body or a harm posed by the hazard.

Ergonomic hazards include badly designed workstation, tools and equipment, vibrations, frequent lifting, repetitive motion, awkward postures etc.

2.6.5 Chemical Hazards

This present itself when an employee is exposed to any chemical within the workspace. They all do not pose equal risks, but certain employees might be very allergic to even very minute doses of these chemicals resulting in skin irritations, sickness or breathing challenges. Chemical hazards may include cleaning products, paints, acids, solvents, vapor and fumes from welding; gases such as propane, CO₂, carbon monoxide (CO), helium (He) etc.
2.6.6 Psychosocial Hazards

Psychosocial hazards refer to the interactions among occupational factors such as job requirements, work organization, management and other work environment conditions on one side and employee characteristics such as capabilities and necessities. It therefore references the variety of workplace interactions that have a detrimental effect on worker’s health through their experiences and insights (Cooper, 1998).

A psychological hazard refers to any occupational danger that impacts the mental and physical health of employees which affects the individual’s ability to cope and function in safe and healthy way (Government of Alberta, 2011). (Cox & Griffiths, 2005) as well saw psychosocial hazards as those characteristics of the design, work administration, the social and organizational contexts of labour with the ability to cause a mental or physical injury or both.

The (EU-OSHA, 2007) observed that the organization and management of tasks at the workplace recently has resulted in novel challenges and risks in occupational health and safety. Work-related stress and violence at the workplace have been observed as a major problem in work-related health and safety associated with psychosocial hazards (EU-OSHA, 2007). These psychosocial hazards, also known as psychological risks, have been determined not to affect the health and safety of the workforce alone but also on the organization’s health and wellbeing as well.

2.7. Health Implications of Workplace Hazards

It is well established that occupational hazards and risks impacts negatively on employee’s health, work productivity and the nation at large. Consequently, the quantification of variety of impacts resulting from occupational health hazards is generally tough. The World Bank and the international labour organization (ILO) reports on some statistics on occupational illness and injuries based on some approximations. Nevertheless a huge percentage of occupational injuries and illnesses are unreported (Joubert, 2002).
Economic dynamics and changes in job distributions in a lot of countries has shifted occupational hazards and injuries from the primary industries such as agricultural and mining to manufacturing and service industry. It is estimated that about 271 million occupational injuries, 2 million occupational fatalities and 160 million occupational illnesses happens globally per annum. However, the risk of occupational accidents is about 10-20 times higher in developing countries as compared to that of the developed world. This is as a result of the fact that a large percentage of the workforce are engaged in small and medium scale industries where minimum occupational health and safety standards set by the WHO and ILO are not strictly enforced.

Globally, a lot of people work under hazardous conditions that are detrimental to their health and safety. The worldwide estimates for fatalities from work related diseases and injuries stands at 1.1 million annually, a number roughly similar to the number of people dying from malaria annually.

2.8 Forms of Occupational Hazards Faced by Informal Manufacturing Workers

There are numerous hazards that can be found in most workplaces within informal work environments. Some of the obvious causes of these hazards are dangerous working conditions like slippery floors, unguarded machinery, and insufficient fire precautions. In addressing OHS issues in the informal manufacturing sector, four main forms of occupational hazards have been identified. They include physical, psychosocial, chemical and ergonomic related hazards. These hazards and their respective types are further discussed below.

In the manufacturing industry, permanent hearing loss from noise hazards is the major health issue of concern. Machine vibrations, noise and non-ionising radiations can all impact negatively on the health of employees. About 10-30 percent of employees in advanced countries are exposed to noise as opposed to up to 80 percent of employees in developing countries (Amedofu, 2002). Noise exposure therefore has to be controlled by the provision and
use of ear plugs, and also controlling extent employee exposure by proper scheduling of work. Additionally, problems with sanitation and its associated effects, visibly affect most informal manufacturing workers.

The effect of working conditions can be physical, psychological or both. Psychosocial hazards often cause social and mental health issues. Workers suffering from psychosocial issues often exhibit signs of stress, tiredness and general disinterest in work. Work types that always demand concentration, work associated with violence and irregular work schedule can have detrimental psychosocial impact.

Chemical hazards are commonest form of hazards in industries that use chemicals and metals in their production processes to manufacture consumer goods such as the textile and construction industry. Chemicals however are now being used in a lot of everyday activities and regular industries such as cleaning, office works, cosmetics and beauty services, painting and hospitals. Some adverse impact of chemicals on health include cancers, damage to the central nervous system, respiratory challenges, metal poisoning and reproductive disorders (United States Environmental Protection Agency, 2010).

Finally, ergonomic hazards are conditions at the workplace that are capable of causing damage to the musculoskeletal system. Repetitive tasks and static muscular load are also common among many informal manufacturing occupations and can lead to injuries and musculoskeletal disorders. In most developing countries, such disorders are the main cause of both short-term and permanent work disability and usually lead to adverse impact on their economic wellbeing (Margottini, 2007).
CHAPTER THREE

3.0 METHODOLOGY

3.1 Introduction

This section presents the methods and procedures used in carrying out this research and is made up of detailed description of study design and location, study population, sampling procedure and techniques. It further includes data collection tools, ethical considerations, data processing and analysis.

3.2 Study Design

A cross-sectional study was conducted using questionnaire administration and personal observation checklist. Data was collected on the determinants of occupational injuries among workers in Accra Brewery Limited.

3.3 Study Area

This study was conducted at the Accra Brewery Limited, which is located at Graphic road in the Greater Accra Region of Ghana. The company was established in 1931. It has a workforce of about 300. The company produces alcoholic and non-alcoholic beverages. All workers at site was considered as source population and workers who were directly engaged in the production process were considered.
3.4 Study Population
The study population was made up of 300 employees in Accra Brewery Limited in Ashiedu Keteke Sub metro in the Greater Accra region.

3.5. Inclusion Criteria and Exclusion Criteria

3.5.1 Inclusion Criteria
This involved all factory workers working in Accra Brewery Limited, within the selected strata and had worked for more than six months at the study site.

3.5.2 Exclusion Criteria
Students and Visitors attached to ABL to their respective departments were excluded.
3.6. Sample Size Determination

The Slovin’s formula was adopted to estimate the required sample size for the study. From Slovin’s formula;

\[ n_0 = \frac{N}{1+N \cdot e^2} \]

Where:

- \( n_0 \) = Estimated sample size
- \( e \) = margin of error was estimated as 0.05 (5%)
- \( N \) = Population size

ABL has 260 workers on site.

Therefore, the sample size was calculated as follows

\[ n_0 = \frac{260}{1+(260 \times 0.05^2)} = 157.58 \approx 158 \text{ Respondents} \]

The minimum representative sample was estimated as 158. 180 questionnaires were administered with the excess 22 (13% of total sample size) accounting for non-responses.

3.7. Sampling Method

Stratified sampling technique was employed in this study. Two types of sampling approaches were used in this study. The population was first stratified based on their various departments and then random sampled.

The stratification variable was occupational injuries. The various departments in ABL (Supply, Logistics, Finance, Commercial and People) were put into five (5) strata using proportionate allocation. Employees in each department were numbered serially using their staff identification numbers. The lottery method of sample selection was used in selecting the participants from each department. The rationale for this stratification was that employees
would exhibit homogeneity in potential injuries associated with their jobs if they belonged to the same department.

**Proportionate Sampling Methods**

The sample size from each stratum was determined using the stratified sampling formula below:

\[
\text{sample size of the strata} = \frac{\text{Size of entire sample}}{\text{population size}} \times \text{layer size} \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cd \[23\]
factors and their knowledge about OSH that could contribute to occupational injuries in ABL. The on-site personal observation was done using a hazard identification checklist and short interviews for physical analysis of the working environment.

Almost all the questions were closed-ended with multiple options to make it easier for respondents to answer. As indicated by Glasow (2005), it helps the researcher in the analysis of data. The few open-ended questions that were included allowed the participants respond in the way they chose to. This served as the primary source of data collection.

3.9. Variables of the Study

Occupational Injuries among brewery workers was the dependent variable in this study. Independent variables which could affect the dependent variable were the personal characteristics such as sex, age, marital status, educational level, work experience, job category and gender. The worker behavioural variable such as use of PPEs, worker environment variable such as health and safety training and workers’ level of knowledge were also measured as independent variables that could affect occupational injuries.

3.10. Data Management and Analysis

The collected data was cleaned, entered and analyzed using SPSS for Windows version 22. Descriptive statistics, binary logistic and logistic regression analysis were applied to see the effect of predictor variables on the frequency of occupational injuries. Odds ratios with 95% confidence intervals were calculated for each of independent variables in logistic regression model with occupational injury as the primary dependent variable to assess the determinants.
3.11. Ethical Consideration

3.11.1. Anonymity, Confidentiality and Right to Withdraw from the Study
The protection of human subjects concerning interview confidentiality and respect for respondents was adhered to. There was no judgemental gestures or further probing for answers when respondents were reluctant to provide information.

Additionally, all respondents’ data were confidential. They were assured of their right to withdraw from the study at any time without any adverse consequences on them.

3.11.2. Consent and Permission for Conduct of Study
Ethical approval was sought from the Ghana Health Service Ethics Review Committee before the conduct of the study. Additionally, written informed consent was sought from employees after explaining the benefits and risks involved in participation. Permission was also sought from the management of Accra Brewery Limited. Informed consent was also sought from the respondents before the commencement of the study.

3.11.3. Risk of Participation in the Study
Apart from minimal risks involving questions about respondents’ socio-demographic characteristics, which were little uncomfortable to answer and the time spent in answering the questionnaire, participation in the study did not entail risks. The questionnaires were administered to respondents in an environment that was devoid of disturbances.

The objectives of the study were explained to the participants and their informed consent were sought. Participants who consented to participate in the study were made to sign the consent form before they responded to the items on the questionnaire.

Apart from members of the research team, such as the researcher and supervisors, no other party was given access to the data collected from participants without their consent.
CHAPTER FOUR

4.0. RESULTS

4.1. Introduction

This section covers findings of the study. The results include data on main variables studied as well as background characteristics of the study participants.

4.2. Socio-demographic characteristics of the study participants

Table 4.2 summarizes some socio demographic characteristics of the study participants.

A total of 180 questionnaires were administered during primary data collection. However, about 158 questionnaires were successfully retrieved accounting for a response rate of 93% (158/180). The study categorized Sex into male and female. The outcome of the finding indicates that more than half 68.35%, of the respondents were male while female constitutes 31.65% of the sampled population. Also, the study examined the age of the participants and the outcome indicated that 78 (49.37%) of those whose age ranged between (26-35) years had the highest frequency. This was followed by individuals of age between (18-25) years old which constitutes 68 (43.04%) and individuals of age above 36 years formed the minority, 12 (7.89%).

In addition, approximately more than three-fourth of participants 125 (79.11%) of the total number of participants were single, 31 (19.62 %) were married and 2 (1.27%) were divorce or separated.

The study revealed the educational level of the respondents as 79 (50%) for Tertiary, 40 (25.32%) for Secondary and 39 (24.68%) for Primary education.
The tenure of engagement of employees was represented as; Contract employee 109 (68.99%), Permanent employee formed 49 (31.01%).

Furthermore, the participants operated at different departments in ABL. The department considered in this study includes supply, finance, commercial, logistics and people. The outcome of the results indicated that Supply constituted the highest frequency, which represents 99 (62.66%). The participants who operated at Logistics, Commercial, Finance and People constituted 27 (17.09%), 10 (6.33%), 10 (6.33%) and 12 (7.59%) respectively.

The study investigated the number of years of experience at Accra Brewery Limited. The study results revealed that more than half (50.63%, n = 80) of the total number of participants have worked between 1-5 years old. Also, approximately about 32% (n = 50) of the participants have spent less than a year at work. Workers who had more than 10 years’ experience had the least frequency representing 10 (6.33%).
<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency of Respondents (f)</th>
<th>Percentage of respondents %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>108</td>
<td>68.35</td>
</tr>
<tr>
<td>Female</td>
<td>50</td>
<td>31.65</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>125</td>
<td>79.11</td>
</tr>
<tr>
<td>Married</td>
<td>31</td>
<td>19.62</td>
</tr>
<tr>
<td>Divorced/ Separated</td>
<td>2</td>
<td>1.27</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-25</td>
<td>68</td>
<td>43.04</td>
</tr>
<tr>
<td>26-35</td>
<td>78</td>
<td>49.37</td>
</tr>
<tr>
<td>36 and above</td>
<td>12</td>
<td>7.59</td>
</tr>
<tr>
<td><strong>Educational level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>39</td>
<td>24.68</td>
</tr>
<tr>
<td>Secondary</td>
<td>40</td>
<td>25.32</td>
</tr>
<tr>
<td>Tertiary</td>
<td>79</td>
<td>50</td>
</tr>
<tr>
<td><strong>Tenure of Engagement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contract Employee</td>
<td>109</td>
<td>68.99</td>
</tr>
<tr>
<td>Permanent Employee</td>
<td>49</td>
<td>31.01</td>
</tr>
<tr>
<td><strong>Department</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply</td>
<td>99</td>
<td>62.66</td>
</tr>
<tr>
<td>Logistics</td>
<td>27</td>
<td>17.09</td>
</tr>
<tr>
<td>Commercial</td>
<td>10</td>
<td>6.33</td>
</tr>
<tr>
<td>Finance</td>
<td>10</td>
<td>6.33</td>
</tr>
<tr>
<td>People</td>
<td>12</td>
<td>7.59</td>
</tr>
<tr>
<td><strong>Years of Experience</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than a year</td>
<td>50</td>
<td>31.65</td>
</tr>
<tr>
<td>1 to 5 years</td>
<td>80</td>
<td>50.63</td>
</tr>
<tr>
<td>6 to 10 years</td>
<td>18</td>
<td>11.39</td>
</tr>
<tr>
<td>More than 10 years</td>
<td>10</td>
<td>6.33</td>
</tr>
</tbody>
</table>
4.3. Determinants of Occupational Injuries among Respondents

From Table 4.3, 58 employees representing 36.7% of the total 158 respondents in this study had sustained occupational injury. Out of this, 41 (26.0%) contract and 17 (10.7%) permanent employees had sustained in an occupational injury. The test of independence between tenure of employee (Contract or Permanent) and sustenance of occupational injuries resulted in a p-value of 0.433.

Out of 108 male respondents, 46 constituting 29.1% of the total employees had sustained an injury and for the remaining 50 females, 12 constituting 7.6% of the total employees sustained an injury. The test of independence between gender of employees (male or female) and their sustenance of occupational injuries resulted in a p-value of 0.018.

Additionally, out of the 58 employees who had sustained occupational injury, 26 (16.5%), 27 (17.1%) and 5 (3.2%) were in age groups 18-25, 26-35 and 36 and above, respectively. The test of independence between age of employees and sustenance in occupational injuries resulted in a p-value of 0.843.

The distribution of employees involved in occupational injury by education are, 32 (20.3%) for primary education, 17 (10.8%) for secondary education and 9 (5.7%) for tertiary education. Additionally, the test of independence between employees’ educational level and sustenance of occupational injuries resulted in a p-value of 0.000.

According to the results, majority of the respondents were in Supply department constituting 99 (62.7%). Of these 37 (23.7%) sustained an injury.

These employees were mainly in technical, operations, packaging, brewing, utilities units.

Furthermore, majority of the respondents had served in the brewery company for 1-5 years. Of these, 29 (18.4%) had sustained occupational injuries. This was followed by employees
with service length of less than 1 year among whom 26 (16.5%) had sustained occupational injuries.

For employees who had served for 10 years and more, none had been involved in occupational injury. The number of hours workers spent per week was also checked.

From Table 4.3, majority of the employees considered in the study spent 40 hours a week at work. In this category, 35 (22.2%) had been involved in occupational injuries. This is followed by employees that spent more than 40 working hours a week at work. This category recorded 11 (7.0%) who had been involved in an injury.

The test of independence between working hours per week and involvement in occupational injuries gave a p-value of 0.007.
Table 4.3. Test of association between Independent Variables and Occurrence of Occupational Injury among Respondents

<table>
<thead>
<tr>
<th>Tenure of Engagement</th>
<th>Involvement in Occupational Injury</th>
<th>Total</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes (N)</td>
<td>No (N)</td>
<td></td>
</tr>
<tr>
<td>Contract Employee</td>
<td>41 (26.0%)</td>
<td>68 (43.0%)</td>
<td>109 (69.9%)</td>
</tr>
<tr>
<td>Permanent Employee</td>
<td>17 (10.8%)</td>
<td>32 (20.3%)</td>
<td>49 (31.1%)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>46 (29.1%)</td>
<td>62 (39.2%)</td>
<td>108 (68.3%)</td>
</tr>
<tr>
<td>Female</td>
<td>12 (7.6%)</td>
<td>38 (24.1%)</td>
<td>50 (31.7%)</td>
</tr>
<tr>
<td>Age group of Employees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-25</td>
<td>26 (16.5%)</td>
<td>42 (26.6%)</td>
<td>68 (43.1%)</td>
</tr>
<tr>
<td>26-35</td>
<td>27 (17.1%)</td>
<td>51 (32.3%)</td>
<td>78 (49.4%)</td>
</tr>
<tr>
<td>36 and above</td>
<td>5 (3.2%)</td>
<td>7 (4.4%)</td>
<td>12 (7.6%)</td>
</tr>
<tr>
<td>Educational level of Employees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>32 (20.3%)</td>
<td>7 (4.4%)</td>
<td>39 (24.7%)</td>
</tr>
<tr>
<td>Secondary</td>
<td>17 (10.8%)</td>
<td>23 (14.6%)</td>
<td>40 (25.3%)</td>
</tr>
<tr>
<td>Tertiary</td>
<td>9 (5.7%)</td>
<td>70 (44.3%)</td>
<td>79 (50.0%)</td>
</tr>
<tr>
<td>Department of Employee</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply</td>
<td>37 (23.4%)</td>
<td>62 (39.2%)</td>
<td>99 (62.7%)</td>
</tr>
<tr>
<td>Finance</td>
<td>1 (0.6%)</td>
<td>9 (5.7%)</td>
<td>10 (6.3%)</td>
</tr>
<tr>
<td>Commercial</td>
<td>8 (5.1%)</td>
<td>2 (1.3%)</td>
<td>10 (6.3%)</td>
</tr>
<tr>
<td>Logistics</td>
<td>11 (7.0%)</td>
<td>16 (10.1%)</td>
<td>27 (17.1%)</td>
</tr>
<tr>
<td>People</td>
<td>1 (0.6%)</td>
<td>11 (7.0%)</td>
<td>12 (7.6%)</td>
</tr>
<tr>
<td>Years of work experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than one year</td>
<td>26 (16.5%)</td>
<td>24 (15.1%)</td>
<td>50 (31.6%)</td>
</tr>
<tr>
<td>1 to 5 years</td>
<td>29 (18.4%)</td>
<td>51 (32.3%)</td>
<td>80 (50.7%)</td>
</tr>
<tr>
<td>6 to 10 years</td>
<td>3 (1.9%)</td>
<td>15 (9.5%)</td>
<td>18 (11.4%)</td>
</tr>
<tr>
<td>more than 10 years</td>
<td>0 (0.0%)</td>
<td>10 (6.3%)</td>
<td>10 (6.3%)</td>
</tr>
<tr>
<td>Workers hours per week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 20 hours/week</td>
<td>9 (5.7%)</td>
<td>9 (5.7%)</td>
<td>18 (11.4%)</td>
</tr>
<tr>
<td>20 to 39 hours/week</td>
<td>3 (1.9%)</td>
<td>1 (0.6%)</td>
<td>4 (2.5%)</td>
</tr>
<tr>
<td>40 hours/week</td>
<td>35 (22.2%)</td>
<td>48 (30.4%)</td>
<td>83 (52.6%)</td>
</tr>
<tr>
<td>more than 40 hours/week</td>
<td>11 (7.0%)</td>
<td>42 (26.5%)</td>
<td>53 (33.5%)</td>
</tr>
<tr>
<td>Training of workers on OSH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>5 (3.2%)</td>
<td>0 (0.0%)</td>
<td>5 (3.2%)</td>
</tr>
<tr>
<td>Disagree</td>
<td>15 (9.5%)</td>
<td>2 (1.3%)</td>
<td>17 (10.80%)</td>
</tr>
<tr>
<td>Uncertain</td>
<td>11 (7.0%)</td>
<td>9 (5.7%)</td>
<td>20 (12.7%)</td>
</tr>
<tr>
<td>Agree</td>
<td>15 (9.5%)</td>
<td>38 (24.10%)</td>
<td>53 (33.50%)</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>12 (7.6%)</td>
<td>51 (32.3%)</td>
<td>63 (39.9%)</td>
</tr>
<tr>
<td>Compliance of PPE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>11(7.0%)</td>
<td>79 (50.0%)</td>
<td>90 (57.0%)</td>
</tr>
<tr>
<td>Sometimes</td>
<td>44 (27.8%)</td>
<td>15(9.5%)</td>
<td>59 (37.3%)</td>
</tr>
<tr>
<td>Never</td>
<td>3 (1.9%)</td>
<td>6 (3.8%)</td>
<td>9 (5.7%)</td>
</tr>
<tr>
<td>Total</td>
<td>58 (36.7%)</td>
<td>100 (63.3%)</td>
<td>158 (100.0%)</td>
</tr>
</tbody>
</table>

*Significant at 5%   **Significant at 1%
4.3.1 Significant demographic characteristic and other work-related factors of injury

To assess the effect of the significant demographic characteristics of employees and other working attributes on sustenance of occupational injuries, a binary logistic model was fitted. The model had the variable “involvement in occupational injuries” with responses (Yes/No) as the dependent variable and sex, educational Level, working hours per week, PPE compliance, OSH Training as independent variables.
Table 4.3.1 below, presents the results of the Omnibus test of the model. From the p-value 0.000, it can be concluded that the overall model is statistically significant.

**Table 4.3.1 Omnibus Tests of Model Coefficients**

<table>
<thead>
<tr>
<th></th>
<th>Chi-square</th>
<th>Df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>142.02</td>
<td>5</td>
<td>0.000</td>
</tr>
<tr>
<td>Block</td>
<td>142.02</td>
<td>5</td>
<td>0.000</td>
</tr>
<tr>
<td>Model</td>
<td>142.02</td>
<td>5</td>
<td>0.000</td>
</tr>
</tbody>
</table>

### 4.3.2. Model Summary

Table 4.3.2 below presents the model summary. The Nagelkerke R value of 87.9% is a pseudo value which means that the model as fitted explains 87.9% of the variability in the response (Involvement in Occupational Injury).

**Table 4.3.2. Model Summary**

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>44.928a</td>
<td>.643</td>
<td>.879</td>
</tr>
</tbody>
</table>

### 4.3.3 Prediction of Occupational Injuries among Respondents Based on Independent Variables

From Table 4.3.3 the overall correct prediction rate is 91.8%. This indicates that the fitted model or the independent variables considered in the model were 91.8% accurate in predicting occupational injuries among the employees. The sensitivity and specificity rate of the fitted model have also been calculated in Table 4.3.3.

**Table 4.3.3 Prediction of Occupational Injuries among Respondents Based on Independent Variables**

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Involvement in Occupational injury</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Step 1</td>
<td>Involvement in Occupational Injury</td>
<td>Yes 51</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 87.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>94 94</td>
</tr>
<tr>
<td></td>
<td>Overall Percentage</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>91.8</td>
</tr>
</tbody>
</table>

The cut value is .0.500
4.3.4. Logistics Regression of Occupation Injuries on the study variables

A simple logistic regression analysis was performed to predict occupational injuries using educational level, PPE compliance, OSH training and injuries cause. The study outcome revealed that educational level (OR = 0.097, 95% CI: 0.031-0.291, \(p\)-value = 0.000), OSH training (OR= 0.23, 95% CI:0.092-0.571, \(p\)-value = 0.002), PPE compliance (OR= 5.957, 95% CI:1.171-20.745, \(p\)-value = 0.005) and injuries cause (OR= 0.485, 95% CI:0.344-0.685, \(p\)-value = 0.000) have statistically significant effect on occupational injuries. The likelihood ratio chi-square of 159.43 with a \(p\)-value of 0.000 implies that the overall model (model with predictors) fit significantly better than an empty model (i.e., a model with no predictors).

**Table 4.3.4. Logistics Regression of Occupation Injuries on the study variables**

<table>
<thead>
<tr>
<th>Occupation Injuries</th>
<th>Odds Ratio</th>
<th>Std. Err.</th>
<th>z-value</th>
<th>P-value</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education level</td>
<td>0.0970327</td>
<td>0.0550647</td>
<td>-4.11</td>
<td>0</td>
<td>0.03191 0.2951</td>
</tr>
<tr>
<td>OSH training</td>
<td>0.2296563</td>
<td>0.1066789</td>
<td>-3.17</td>
<td>0.002</td>
<td>0.0924 0.57079</td>
</tr>
<tr>
<td>PPE compliance</td>
<td>5.957794</td>
<td>3.791982</td>
<td>2.8</td>
<td>0.005</td>
<td>1.71127 20.7421</td>
</tr>
<tr>
<td>Injury cause</td>
<td>0.4854498</td>
<td>0.0852434</td>
<td>-4.12</td>
<td>0</td>
<td>0.34409 0.68488</td>
</tr>
<tr>
<td>_cons</td>
<td>51521.69</td>
<td>134462.6</td>
<td>4.16</td>
<td>0</td>
<td>309.388 8579805</td>
</tr>
</tbody>
</table>

Figure 3.0 presents a pictorial representation of the distribution of cause of injury among employees. As shown, of the 58 employees who had been involved in occupational injuries, 22 were due to inadequate training, 20 were due to work fatigue, and 10 were due to non-compliance to PPEs usage.
Additionally, 3 were due to job dissatisfactions, 2 due to health problems and 1 as a result of alcoholism. It is evident from table 4.3.4 that majority of the occupational injuries were due to inadequate training, work fatigue and non-compliance to PPEs.

![Figure 3.0 Distribution of cause of injury](image)

Figure 3.0 Distribution of cause of injury

Figure 4.0 presents the distribution of the affected body parts in occupational injuries. Out of the 58 occupational injuries recorded in the study, 31 affected employees’ upper limbs, 11 affected lower limbs, 8 affected heads or necks, 5 affected many parts of the body concurrently and 3 affected the abdomen or trunk.
Figure 4.0 Distribution of affected body parts
CHAPTER FIVE

5.0. DISCUSSIONS

5.1. Introduction
The study was conducted to assess the determinants of occupational injuries among workers in Accra Brewery Limited in the Greater Accra Region of Ghana.

The study found that some socio-demographic variables such as work environment and behavioral factors played roles of varying significance in occupational injuries among brewery workers.

5.2. Proportion of Brewery workers with Occupational Injuries
The results of this study showed that a high proportion (36.7%) of the employees had sustained one form of occupational injury or another, which confirmed the reports by Steen et al., (1997) & Birabi et al, (2012), that high prevalence of occupational injuries and diseases occur among workers in various African countries including Nigeria and Ghana.

This finding could be attributed to a varity of factors that influence the recurrence of injuries such as lack of education, inadequate training and work experience as well as lack of use of PPEs. For example Bhattacherjee et al., (2003) reported that increase educational level was associated with low level of occupational injuries.

Muchemi, (2013) and Piombino, (2005) also indicated that occupational injuries can be avoided with the availability and use of PPEs.

For example, in this study, a majority 130 (82.28%) of the respondents had either less than one year or were within 1-5 years of work experience in the company and could have a high probability of making mistakes leading to occupational injuries. Additionally, half, 79 (50%) of the total number of participants did not have tertiary education and have only a primary level 39 (24.68%) or secondary, 40 (25.32%) level of education. Since most of these individuals may
have a low level of ability to read and understand safety protocols and manuals, they could make operational mistakes leading to injury. It is for this reason that the test of association between educational level and sustenance of occupational injury was significant (P-value <0.0001).

The results of this study also showed that occupational injuries sustained were significant on the upper and lower limbs, and this finding was similar to that from India (Kumar, Rathnakar, & Harsha Kumar, 2010), Egypt (Abbas Abbas, Mohamed, & Ghareeb, 2013), and Ethiopia (Takele & Abera 2007). The involvement of upper and lower limbs may be due to exposure to unguarded machines and tools. Human factors such as improper working style, conscious risk-taking, and lack of complying with PPEs and safety rules may also be the underlying reason for such injuries (Meleko et al., 2017)

5.3. Socio-Demographic Characteristics of Study Participants
This study established a significant relationship between employees’ level of education and occurrence of occupational injury. This could be due to the fact that work processes in ABL requires high expertise while others might need contract laborers to manage the factory tasks. This is consistent with a study done in Brazil but inconsistent with studies conducted in Ethiopia (Yiha & Kumie, 2010).

Most occupational health and safety studies conducted in developing countries revealed that increased educational level has been associated with low rate of occupational injuries (Bhattacherjee et al., 2003).

This could be due to the fact that high educational level is more likely to increase workers safety and health practice that can prevent them from occupational injuries. But a cross-sectional study done in Ethiopia among small- and medium-scale factory workers revealed that educational level did not show any statistical significant association with occurrence of
occupational injury (Tadesse & Kumie, 2007). This difference may be due to the fact that education only cannot result in occupational injury when the level of hazards is high and the use of reliable techniques and safe work organizations are limited (Tadesse & Kumie, 2007).

The department of employees was also significantly associated with occupational injuries with Supply department constituting 23% valid responses out of 62.7% of the total respondents. This was followed by Logistics and Commercial departments respectively. The reason could be due to exposure to a lot of risk sustained in occupational injury.

Finance and People departments who had the least number of employees involved in occupational injuries may happen because their core work involves prolong sitting, typing, working with computer which are mainly administrative, risk-free and employees had little/no exposure to site work

5.4. Knowledge About Occupational Injuries Among Brewery Workers
It is evident from Table 4.3.4 and Figure 3.0 that most employees lack requisite training and awareness of workplace safety. Inadequate training was found to be significant in determining employees’ involvement in occupational injuries. Evidence from figure 3.0 shows that most of the occupational injuries could be avoided through adequate training and OSH knowledge acquisition.

5.5. Determinants of Occupational Injuries Among Brewery Workers
Work environment and behavioral characteristics of respondents such as the use of PPEs, and OSH training with (P value <0.05) were significantly associated with occupational injuries in this study. Few workers accounted for OSH training and use of PPEs, most workers who did not take OSH training and failed to use PPEs resulted in the occurrence of occupational injuries.

A strong association between OSH training and reduced occupational injury rates among employees has been established by different researchers. This may be due to the fact that OSH
training could encourage employees to be safer and educate them to do the right things at their workplaces in order to correct their safety behaviors (Abebe & Fantahun, 1999).

Different studies revealed that workers’ behavior are factors that predict directly their health status in the workplace. Such behaviors which are important with brewing companies in developing countries are alcohol consumption and smoking cigarette (Molla, Salgedo, & Lemu, 2015). In this study, the odds of occupational injury was lower among those who consumed alcohol than those who did not consume alcohol. This result was different from that reported among workers from Egypt (Abbas Abbas et al., 2013) and Addis Ababa (Ministry of Health (MOH)), 1996 ). This may be due to the presence of alcohol detectors in the facility which may deter employees from consuming alcohol during working hours.

Evidence from this study showed that more hours worked per week are not more risky just because they are concentrated in intrinsically dangerous occupations or because of the personal characteristics of workers engaged in those schedules. The findings of this study is in accordance with the prediction that more hours worked per week indirectly cause occupational injuries through a causal process, for example, by inducing work fatigue or stress in workers who are affected. For instance, employees who averagely engage in long hours of work (for example, (>40 hours per week) can be presume to suffer more occupational injuries than those who are engaged for shorter hours (for example, <20 hours per week), even if both groups are faced with the same type of risks, because the period spent by the former group spent more time and “at risk” for injury.

5.6. Strength and Limitation of the Study

5.6.1 Strength
A simple qualitative check shows that ABL had Organisational and Safety policies and in recent years has mounted series of training to sensitize its employees on OHS policies.
The study revealed that OHS training was significant in determining employee’s involvement in occupational injuries. Through a pareto chart, inadequate training was the leading cause of occupational injuries in ABL.

This is a very important revelation which could have been hidden if not through this study.

**5.6.2 Limitations**

The data used for this study was collected from ABL. There are other breweries in Ghana which are also suitable to be included in the study. The study limited itself to ABL because of data availability, sensitivity and time constraints. It is imperative that subsequent studies include other breweries in Ghana to make the result more representative.

Additionally, the absenteeism of workers injured from worksite and healthy-worker effect may underestimate injury rates. The cross-sectional nature of the study design limits an interpretation of clear causal relation between the associated factors and the occupational injuries in this study.
CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION
The proportion of employees involved in occupational injuries were estimated to be 36.7% which represent 58 employees out of a total of 158.

Employees’ sex, educational level, year of experience, department were some socio-demographic factors found to have significant effect on their involvement in occupational injuries.

Other factors (environmental and behavioral) such as; OSH training, PPE compliance, work hours per week were also found to have significant effect on employees, involvement in occupational injuries. From the binary logistic regression OSH training, Working hours, Education level, PPE compliance were found to be statistically significant. Specifically, the odds of an employee being involved in an occupational injury increased by 7 times due to inadequate OSH training and by 22 times due to the employees’ educational level.

A pareto chart of cause of injury also revealed that inadequate training, work fatigue, PPE non-compliance are the leading causes of occupational injuries.

An assessment of the affected body parts of employees’ involved in occupational injuries revealed the upper and lower limbs to mostly involved.
6.2 RECOMMENDATIONS

To minimise the occurrences of occupational injuries among workers in Accra Brewery Limited, it is recommended that:

Employees with low educational background are given occupational health and safety trainings on routine use of personal protective devices and promote health and safety at the workplace.

To curtail occupational injuries due to work fatigue, employees workload should be reduced. The occupational health and Safety department in ABL should give special attention to workers in the supply department.

There should be strict enforcement of PPEs usage policy at the workplace.

Workers with low level of knowledge on occupational health and safety guidelines should be equipped with frequent training in order to increase their knowledge on occupational injuries.
REFERENCES


Northumbria University (2002). The Dangerous Substances and Explosive Atmospheres Regulations 2002: SI.


APPENDICES

Appendix A: Survey Questions for Respondents and Consent Form

RESEARCH TOPIC: DETERMINANTS OF OCCUPATIONAL INJURIES AMONG WORKERS IN ACCRA BREWERY LIMITED.

Introduction and consent form

My name is Owusu Ansumaa Bernice, a student at the University of Ghana, pursuing a Master of Public Health degree in Biological, Environmental and Occupational Health. I would like to find out what the major causes of occupational injuries are in ABL and the safety measures that would help minimize these occupational injuries, ill health and improved OSH performance at ABL.

In line with these objectives, I would like to ask you some questions related to occupational health and safety principles associated with your work. The information that you will give in this questionnaire will be kept strictly confidential. You do not need to write your name.

Do I have your permission to proceed?

Yes                No

PARTICIPANT STATEMENT AND SIGNATURE

I hereby certify that I willingly agree to fully participate in the study on the topic “Determinants Of Occupational Injuries Among Workers In Accra Brewery Limited”. All my questions have been satisfactorily addressed.

I understand that I can freely withdraw myself from the study if I so desire at any given time.

Signature of Participant………………………………………………….

Date……………………………………………………

INVESTIGATOR STATEMENT AND SIGNATURE

I certify that the participant has been given enough time to read and study about the topic under study. All questions and concerns raised by the participant have been addressed.”
SIGNATURE……………………………………………………………………
DATE……………………………………………………………………

Instructions

This survey will take about 10-15 minutes to complete.

☐ Please respond objectively to as many questions as possible to ensure that the survey results go into enhancing the implementation of better OSH programs at ABL.

☐ Please keep in mind that there is no right or wrong answer for this survey, and you can also ask for clarifications in case you do not understand a given question.

SECTION A: SOCIAL DEMOGRAPHIC CHARACTERISTICS AND BEHAVIOURAL FACTORS OF RESPONDENTS

In this section, think about your duties, department or area where you spend most of your time “working or offering services. Respond to each question by ticking the appropriate option.

1. What is the nature of your engagement?   a) Contractor employee   b) Permanent employee
2. What is your gender?   a) Male   b) Female
3. Which of the following age brackets do you belong to?  a) 18-25   b) 26-35   c) 36 and above
4. What is your marital status?   a) Single   b) Married   c) Divorced/Separated
5. What is your level of education?   a) Primary   b) Secondary   c) Tertiary
6. Which department do you work in?
   a) Supply (Brewing/Packaging/Quality/ Safety & Environment/ Energy & Fluids / Maintenance
   c) Finance d) Commercial (Sales, Marketing) e) Logistics   f) People
7. How many years have you worked at ABL?  a) Less than 1 year b) 1 to 5 years c) 6 to 10 years d) More than 10 years

8. How long have you worked in your current work area? a) Less than 1 year b) 1 to 5 years c) 6 to 10 years d) More than 10 years

9. How many hours per week do you work? a) Less than 20 hours / week b) 20 to 39 hours / week c) 40 hours / week d) More than 40 hours / week

10. How often did you usually have any kind of drink containing alcohol during the last 2 years? a) Once a week b) Two to Three times a week c) Almost everyday d) Occasionally e) Not at all

SECTION B: WORK ENVIRONMENT DETERMINANTS

In the course of your work what type of hazards are you exposed to and how well are they managed?

<table>
<thead>
<tr>
<th>Physical hazards</th>
<th>Well managed? (tick □ as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present? (circle as appropriate)</td>
<td>Disagree</td>
</tr>
<tr>
<td>Collision with moving vehicles</td>
<td>Y</td>
</tr>
<tr>
<td>Working in confined spaces</td>
<td>Y</td>
</tr>
<tr>
<td>Falls from height</td>
<td>Y</td>
</tr>
<tr>
<td>Slippery surfaces</td>
<td>Y</td>
</tr>
<tr>
<td>Dangerous electrical energy</td>
<td>Y</td>
</tr>
<tr>
<td>Exposure to hot surfaces</td>
<td>Y</td>
</tr>
<tr>
<td>Exposure to steam</td>
<td>Y</td>
</tr>
<tr>
<td>Excessive noise</td>
<td>Y</td>
</tr>
<tr>
<td>Excessive vibrations</td>
<td>Y</td>
</tr>
<tr>
<td>Pressure extremes</td>
<td>Y</td>
</tr>
<tr>
<td>Inadequate lighting</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Poor ventilation</td>
</tr>
<tr>
<td>--------</td>
<td>------------------</td>
</tr>
<tr>
<td>Present? (circle as appropriate)</td>
<td></td>
</tr>
<tr>
<td>Y  N</td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
</tr>
<tr>
<td>Uncertain</td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td></td>
</tr>
</tbody>
</table>

- **Mechanical hazards**
  - Crushing
  - Cutting
  - Grinding
  - Drawing in
  - Entanglement
  - Friction and abrasion
  - Impact
  - Shearing
  - Stabbing and puncture

- **Biological hazards**
  - Micro organisms
  - Exposure to pathogens
  - Dangerous pests and insects

- **Chemical hazards**
  - Handling of chemicals
<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure to fumes</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Exposure to smoke</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Exposure to carcinogens</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Exposure to fossil fuels</td>
<td>Y</td>
<td>N</td>
</tr>
</tbody>
</table>

Physiological hazards

<table>
<thead>
<tr>
<th>Present? (circle as appropriate)</th>
<th>Disagree</th>
<th>Uncertain</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor workstation design</td>
<td>Y</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Unnatural posture / motions</td>
<td>Y</td>
<td>N</td>
<td></td>
</tr>
</tbody>
</table>

Psychological hazards

<table>
<thead>
<tr>
<th>Present? (circle as appropriate)</th>
<th>Disagree</th>
<th>Uncertain</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender harassment</td>
<td>Y</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Excessive work pressure</td>
<td>Y</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Lone working</td>
<td>Y</td>
<td>N</td>
<td></td>
</tr>
</tbody>
</table>

SECTION C: KNOWLEDGE ON DETERMINANTS OF OCCUPATIONAL INJURIES

<table>
<thead>
<tr>
<th>1</th>
<th>ABL as a company has adequate OSH policies</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Uncertain</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

53
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Employees understand the company’s OSH policies</td>
</tr>
<tr>
<td>3</td>
<td>ABL safety information is visible to all staff</td>
</tr>
<tr>
<td>4</td>
<td>I am aware of all hazards in my workplace</td>
</tr>
<tr>
<td>5</td>
<td>I am always involved in risk assessment</td>
</tr>
<tr>
<td>6</td>
<td>Safety operating procedures are available to all workers</td>
</tr>
<tr>
<td>7</td>
<td>Adequate personal protective equipment is provided to all employees</td>
</tr>
<tr>
<td>8</td>
<td>Safety and health induction training is mandatory for all staff</td>
</tr>
<tr>
<td>9</td>
<td>All staff receive refresher OSH training</td>
</tr>
<tr>
<td>10</td>
<td>The factory has adequate number of trained first aiders</td>
</tr>
<tr>
<td>11</td>
<td>I am aware of injury reporting procedures</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>12</td>
<td>Dangerous parts of work equipment are adequately guarded</td>
</tr>
<tr>
<td>13</td>
<td>All workrooms are adequately ventilated</td>
</tr>
<tr>
<td>14</td>
<td>My workstation is always adequately lit</td>
</tr>
<tr>
<td>15</td>
<td>Management understands safety and health issues in my work area</td>
</tr>
<tr>
<td>16</td>
<td>I am strongly encouraged to report unsafe conditions and behavior</td>
</tr>
<tr>
<td>17</td>
<td>I underwent medical examinations before employment</td>
</tr>
<tr>
<td>18</td>
<td>Regular medical tests are done on employees.</td>
</tr>
<tr>
<td>19</td>
<td>I often attend pre-shift safety toolbox talks.</td>
</tr>
<tr>
<td>20</td>
<td>I know the potential emergencies at my work area</td>
</tr>
<tr>
<td>21</td>
<td>There are adequate first aid kits and medical services</td>
</tr>
<tr>
<td></td>
<td>22</td>
</tr>
<tr>
<td>---</td>
<td>----</td>
</tr>
<tr>
<td></td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>
SECTION D: PROPORTION OF WORKERS WITH OCCUPATIONAL INJURIES

a) Have you ever had an injury in the course of work in this industry?
   a) Yes          b) No

   If yes, what type of injury were you involved in?..........................................................................................................................
   ..........................................................................................................................
   ..................................................................................................................................
   ..................................

b) Have you had an incident at work that resulted in injury to you in the last 12 months?
   a) Yes      b) No

   If your answer is ‘yes,’ which part of the body was affected? .................................................................

c) Have you been involved in an activity with great potential to cause an accident at ABL?
   a) Yes          b) No

   If yes, please specify……………………………………………………………………

d) Have you been treated for any injury sustained while working at the brewery?
   a) Yes          b) No

   If yes, please specify type ...........................................................

  e) Have you been hospitalized as a result of injury sustained at ABL?  a) Yes      b) No

   If yes, how many days?.............................................................................................................................

  f) Does your work need visual concentration?  a) Yes          b) No

   If ‘yes,’ the visual demand of your task was...?

   a) Low (almost no need to see fine details >50 cm)          b) High (need to view fine details ≤50 cm)
g) Do you use vibrating tools at your workplace?  
a) Yes  
b) No

If your answer is yes, for how long per day?  
a) Not greater than 1 hr  
b) 2–4 hrs  
c) Greater than 4 hrs

h) Do you have any sleep disorders?  
a) Yes  
b) No

If yes, what could be the reason?  
a) Working more than 8 hrs. without shifting  
b) Working in evening  
c) Trying to do more than one task at a time  
d) Excessive heat  
e) Others

i) Do you use any personal protective device while you are working?  
a) Yes  
b) No

“If yes, what type?  
a) Glove  
b) earplug  
c) respirators  
d) helmet  
e) overalls  
f) goggles  
g) face shield  
h) boots  
i) shoes  
j) other

j) Are machines always maintained immediately when old or unsafe?  
a) Yes  
b) No.

*Thank you for completing this survey.*
Appendix B: Observation Checklist

The following are some of the things to be observed during the study:

**Questions Yes / NO**

1. Does the site have an adequate number of portable fire extinguishers?
2. Are the portable extinguishers located, positioned properly and easily accessible?
3. Is there a permit to work procedure for the high-risk activities?
4. Is there adequate safety information / hazard warning signage?
5. Are all employees wearing PPE as required?
6. Are the highly risk/electrical rooms/areas restricted to authorized personnel only?
7. Are evaluations made through the site to determine that lighting levels are adequate during all shifts?
8. Are floor and walking ways clean and orderly free from spillages and obstructions?
9. Are cylinders with compressed gages stored upright in specifically designated areas and secured against falling?
10. Are there well marked fire exists and fire assembly points?
11. Have high risks/noise areas been adequately posted with appropriate warning signs?
12. Are there adequate and accessible first aid stations
Appendix C: Ethical Approval Form

---

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

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

Ms/Ref GHS/R&D/ERC/Admin/App
Your Ref. No. 19/250

Bernice Ansomaa Owusu
University of Ghana
School of Public Health
Legon

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

<table>
<thead>
<tr>
<th>GHS-ERC Number</th>
<th>GHS-ERC 054/05/19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Title</td>
<td>Determinants of Occupational Injuries among Workers in Accra Brewery Limited</td>
</tr>
<tr>
<td>Approval Date</td>
<td>19th June, 2019</td>
</tr>
<tr>
<td>Expiry Date</td>
<td>18th June, 2020</td>
</tr>
<tr>
<td>GHS-ERC Decision</td>
<td>Approved</td>
</tr>
</tbody>
</table>

This approval requires the following from the Principal Investigator:

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.
- Please note that any modification of the study without ERC approval of the amendment is invalid.

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

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

SIGNED..........................................................
Dr. Cynthia Bannerman
(GHS-ERC CHAIRPERSON)

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

---