

**ASSESSMENT OF THE PREVALENCE OF OCCUPATIONAL HEALTH RELATED
INJURIES AND USE OF SAFETY MEASURES AMONG EMPLOYEES IN BREWERY
FACTORY IN RWANDA**

(CASE STUDY: BRALIRWA INDUSTRIES)

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DECLARATION

I, Edward MBONIGABA, do hereby declare that all the work presented in this thesis is my own work and is original. It has never been presented either in part or in full for publication or any award in any other institution. I henceforth present it for the award of the degree of Master of Science Degree in Public Health of International Health Science University, Kampala, Uganda.

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DEDICATION

I dedicate this piece of work to my dearest family especially my mother, brothers, sisters and friends for their moral and financial support toward accomplishment of this research work

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Special thanks to my academic supervisor Dr. Regina Mbabazi for the guidance at various stages of writing this dissertation. This guidance has greatly enriched my learning. I also appreciate the faculty of Institute of Health Policy and Management of International Health Science University, academic and administrative staff of International Health Science University who gave me their moral support and courage for this research to be accomplished and who facilitated various course units that have contributed to improving my research and scientific writing skills.

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ABBREVIATIONS AND ACRONYMS

GOR:	Government of Rwanda
HSE:	Health and Safety Executive
IHSU:	International Health Science University.
ILO:	International Labor Organization
ISAR:	National Agricultural Research Institutes.
LDCs:	Low Developing Countries
MoHR:	Ministry of Health Rwanda
OHS:	Occupational health and safety
OHSA:	Occupational health and safety Administration
PSF:	Private sector federation.
RBS:	Rwanda Bureau of Standards
RDB:	Rwanda development board
SPSS:	Statistical program for social science
WHO:	World Health Organizations

OPERATIONAL DEFINITIONS

A hazard: Is something that can cause harm if not controlled.

Assessment: The classification of something with respect to its worth

Attitude: Complex mental state involving beliefs feeling and values to act in certain way

Behavior: Manner of acting or controlling yourself

Brewing: Production process of beer through steeping starch in water and yeast for fermentation.

Ergonomics: preventative measures, which help in designing workstations, work processes, tools or equipment to fit the individual worker,

Excessive heat: heat is recorded as excessive if a worker is found sweating when naked or with light clothing; if investigator feels as sudden heat wave when entering into the industry.

Excessive noise: noise that makes it difficult to communicate with your neighbor without shouting.

Exposure: Is the occupation-caused condition with potential immediate or long-term negative effect on the health.

Good workplace: Ergonomic workplace with the potential to increase workers' health, safety and work performance or productivity.

Hazard analysis: is a process in which individual hazards of the workplace are identified and assessed.

KAP: knowledge attitude and practice

Knowledge: The psychological result of perception and learning and reasoning.

Occupation: When a person engages in work which brings livelihood salary fringe benefits and other facilities.

Occupational health: refers to the identification and control of the risks arising from physical, chemical, and other workplace hazards in order to establish and maintain a safe and healthy working environment. Occupational health and safety is one important aspect of human concern and it aims adaptation of work to man for the promotion and maintenance of highest degree of mental physical and social wellbeing in all occupation (WHO, 2001).

Occupational safety: Working situations where injury risks or where, poor work environment, or non-ergonomic practices are minimized by safety measures.

Outcome: Is the harm that results from an uncontrolled hazard.

Severity of injury: characterized by absence from work for three days in last one year and hospitalized for more than 24 hours.

Work related injuries: condition sustained by a worker in connection with performance of his work place.

ABSTRACT

Background

Worldwide, occupational health related injuries have become potential public health issue leading to disability and death causing abandonment of work. Rwanda is one developing country which is at risk of having work related injuries due to the fact that its industrial economy is growing at a very fast rate which has attracted many investors in industrial sector.

Objectives: To assess the prevalence of occupational health related injuries and use of safety measures among employees and specifically to identify the types of occupational health related injuries suffered by the brewery employees, establish the occupational safety measures in place at Bralirwa processing industries in Gisenyi Rwanda and identify factors influencing use of occupational safety measures among the brewery employees in Bralirwa processing industries in Gisenyi Rwanda

Methods:

This was a descriptive cross-sectional study design carried out in Bralirwa processing industries in Kigali Rwanda from August to October 2012. This study employed mainly quantitative methods of data collection. A sample of 220 respondents was selected. Quantitative data were collected using semi-structured questionnaires and observational check list. Data was analyzed using SPSS version 17 and Stata soft ware computer packages. The study findings were summarized using proportions, percentages, frequencies and presented tabular format and figures.

Results

Majority 72.7% (160/220) of the respondents were male. Half 50% (110/220) of the respondents were in the age range of 31-45 years. The findings indicated that 86.4% (190/220) of the respondents reported having suffered from occupational health related injuries. The injuries suffered were mainly physical injuries like falls, cuts and electrocutions. The ergonomic related injuries were mainly many 25.5% (56/190) of them reported falls, 21.8% (48/190) reported cuts, 17.7% (39/190) reported electrocution, only 8.6% (19/190) and 4.5% (10/190) reported fractures and dislocations as ergonomic risks experienced by them in the last 12 months respectively.

The factors influencing use of occupational safety measures cited by the respondents included provision of personal protective equipment, training at work place on use the safety equipment, regular supervision, job satisfaction, sleeping disorders, alcohol consumption and work related risk experience (ever got injury).

Conclusions

Physical and ergonomic injuries, falls, cuts, electrocutions, fractures and dislocations were the most prevalent injuries suffered by the employees at at Bralirwa processing industries Gisenyi, Kigali Rwanda. The factors noted to influence use of occupational safety measures at Bralirwa processing industries included provision of personal protective equipment, training of the workers on use the safety equipment, regular supervision, job satisfaction and alcohol consumption

Recommendations

The industry management should carry out regular OSH assessments and meeting as required by national law and follow up on risks identified during the assessment. And supervision should be tightened to ensure that all workers at the job put on personal protective equipments.

CHAPTER ONE

1.0: Introduction

The main aim of the study was to assess the prevalence occupational health related injuries and use of safety measures among employees in brewery factory in Gisenyi district, Kigali Rwanda. The research was done for two months, August to October 2012, data was collected and analyzed and later the findings were presented in this report.

Occupational health and safety is an important aspect of public health that affects workers health at work places and reduces service delivery quality and productivity (USAID, 2012). According to World Health Organization (2012) on selected occupation risk factors an estimated 2.9 billion workers globally are exposed to hazards at their work environment. These hazards accounted for an estimated 37% of back pain, 16% of hearing loss, 13% of chronic obstructive pulmonary disease (COPD), 11% of asthma, 8% of injuries, 9% of lung cancer and 2% of leukaemia. In 2000, work-related injuries caused 775000 deaths worldwide (WHO 2001).

Recent estimates of occupational health related deaths by World Health Organization indicated that there were five times as many deaths in males as in females 647000 versus 128000 respectively. And as noted by WHO (2012), the leading cause of occupational death among the six risk factors was unintentional injuries which accounted for 41% followed by COPD 40% and cancer of the trachea, bronchus or lung 13% (WHO, 2012).

Occupational health hazards that are common in brewery process industries include but not limited to explosion risks, exposure to physical and chemical hazards and exposure to noise and vibrations (Breweries of Europe, 2002).

Occupational health and safety basically seeks to maintain the working environment and ability of the labour force as well as identifying prevent and assess hazards within working environment.

Many workers who live in developing countries are at risk of occupation health related injuries (Partanen, 2001) if there is no future effort for the improvement of health and safety measures at work place. For a poor work environment, these risks are serious which may lead employees abandon their work (Vermeaulen, 2000). Economically, Occupational health and safety issues have a close a connection with other components in the regional economy since provision of hygiene, health and safety at work place greatly contribute to economic growth process in many ways (Takala, 1992).

1.1 Background to the study

Occupational health and safety at work is an important aspect of public health that requires workers and employers to adhere to safety standards and guidelines important in protecting and enhancing safety of the work environment. Globally, studies have shown that occupational health related injuries and deaths are rising. According to Concha-Barrientos et al (2005), he estimated that annually approximately 312,000 fatal unintentional occupational injuries occur and Hamalainen, Takala, and Saarela (2007, 2006) estimated that annually about 2 million fatal work-related diseases and occupational accidents occur (345,000 fatal occupational accidents and 1.6 million work-related diseases). They also estimated that annually 263 million occupational accidents occur that cause at least four days of absence from work.

Recent estimates by WHO (2012) show that about 2.9 billion workers globally are exposed to hazards at their work environment (data on selected occupation risk factors).

Whereas occupational health and safety is taken care of as major area of concern to address occupational health related issues at work place, the reverse may be true for developing countries. Hollnagel (2007) in his study on Resilience engineering – why, what, and how? noted that the knowledge and skills understanding of occupational health and safety in developing countries is still lacking. The flow of industrial production to developing countries has increased and continues to increase.

According to Glodstein et al (2001) and Manuaba (2001) it was reported that if the process of globalization is not carried out wisely, there will be an increase in the number of occupational health and safety problems, as well as of ergonomic problems, both in developing and developed countries (Glodstein, Helmer, & Fingerhut, 2001; Manuaba, 2001). By and large the safety of workers at their work places is still wanting in developing countries. Many studies have noted that many workers in the developing countries have continued to be exposed to work related risks at their works places.

According to the Brewers of Europe (2002) report, it's noted that brewery employees are mainly exposed to physical related risks which are typically attributed to heavy manual lifting and carrying crates of bottles and other raw materials; due to recurring work as well as packing and cleaning, and poor work postures caused by inadequate workstation and process activity design. No main chemical and biological occupational related risks were reported by the respondents in this study. The causes of the above occupational related risks were lack of protective gears, poor motivation. Not comfortable to use/ causes irritation, lack of safety & health education and poor motivation

In India, national statistics for all incidences of occupational injuries indicated an annual incidence of occupational diseases between 924,700 and 1,902,300 and 121,000 deaths in India (Liu *et al*, 2005). Based on survey of industrial injury incidence study by (Mohan and Patel 1992) in Northern India they estimated annual incidence of 17 million injuries per year. The major occupational morbidity of concern in India is muscular skeletal injuries noise induced hearing loss and obstructive lung diseases.

According to a study done in urban industries in Ethiopia, the commonest cause of work related injuries were attributed by machinery (29.45%) and those hit by objects were 20.3%.

In a study conducted in Tanzania it was reported that very high exposure levels to at least one hazard such as exposure to sharp metals and electric shocks were common at work place. The use of personal protective gears /equipment was equally found to be poor, with only very few 21% employees using feet shield (boots). Lack of protective gears was noted as the main cause of health problems (Rongo, 2004).

In Kenya it's noted that manufacturing, construction and transport industries account for 41% of accidents, the machine operators and assemblers account for 28% of the risks while others occupants share 31% of work place accidents . This is an indication that these occupations are injury prone while matters of safety are treated causally by both employee and employers (OHS Report, 2003).

In Rwanda, like many other African developing countries following the civil wars of 1994 and 2009, her economy was dually affected. However, in the recent past following political stability the economy registered a notable growth and due to Rwanda's favorable investment policy, there has been setting up of many industrial establishment and increased employment (PSF report 2009 Rwanda). But whereas there growth in the economy and industrial investment, the efforts to reduce occupational health related injuries in industrial sector may not be measuring to the required standards and thus work related injuries remain present in the workplace. Recognizing occupational health related injuries is the first step in establishing risk reduction programs for the workplace to keep work as safe and healthy as possible.

1.2 Problem statement

The occupational related injuries in Rwanda are increasing (MoHR, 2009-2012). The experience in the practice of occupational health is limited. Records of work related injuries and diseases are lacking yet workers in industries are at a great risk of work related injuries. The effects of work related injuries significantly contribute to death, hand carp and abandonment of work which has an impact of the family incomes among the employee and their families. The production in industry may be low due the effects of injuries to the industrial workers.

In Bralirwa processing industries, the management has tried to provide protective, trained first aiders, safety utilities like fire extinguishers and also organized awareness campaigns on occupational health related risks. However, this is not helping to reduce the occurrences of occupational health related risks. It is therefore important to assess the prevalence of occupational health related risks and use of safety measures among employees in Bralirwa brewery so as to identify better interventions for prevention and control of occupational health related risks

1.3 Objectives

1.3.1 Broad objective

To assess the prevalence of occupational health related injuries and use of safety measures among employees in Bralirwa processing industries in Kigali Rwanda.

1.3.2 Specific objectives

1. To identify the types of occupational health related injuries suffered by the brewery employees in Bralirwa processing industries in Gisenyi Rwanda
2. To establish the occupational safety measures in place at Bralirwa processing industries in Gisenyi Rwanda
3. To identify individual factors influencing use of occupational safety measures among the brewery employees in Bralirwa processing industries in Gisenyi Rwanda

1.3 Research Questions

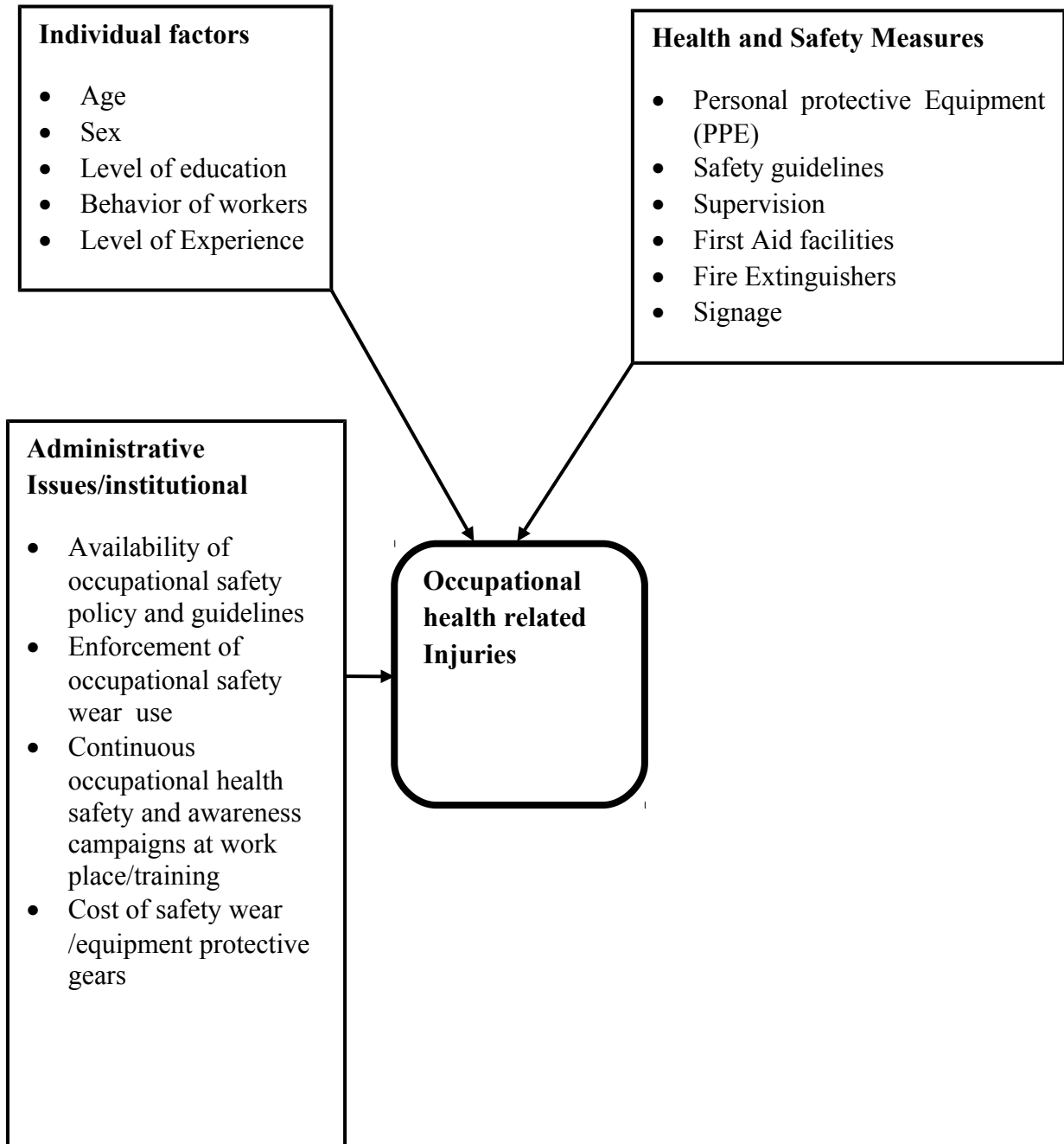
1. What are the types of occupational health related injuries faced by the brewery employees in Bralirwa processing industries in Gisenyi Rwanda?
2. What are the occupational safety measures used by the brewery employees in Bralirwa processing industries in Gisenyi Rwanda?
3. What are the possible factors influencing use of occupational safety measures among the brewery employees in Bralirwa processing industries in Gisenyi Rwanda?

1.4. Significance of the study

This study is expected to generate more information to the already existing body of knowledge in the area of occupational health and safety in Rwanda. Also the research findings will help the policy makers, researchers and brewery employees the gaps existing in the occupational health and safety. These findings will help in drafting appropriate policies and programs that will empower occupational health workers and make them aware of the dangers of poor use of safety measures within the brewery industry.

In addition to the above, the study will also provide future scholars and researchers with information regarding the factors influencing poor use of occupational safety measures.

1.4 Conceptual framework



1.5 Conceptual framework notes

From the conceptual frame work, there are various factors at play to contribute to prevalence of occupational health related injuries. Independent variables that are responsible for the prevalence of occupational health related injuries and use of safety measures may include but not limited to; individual factors such as gender of the workers, age, level of education, training on use safety measures, behavior of the workers like drinking alcohol before or during work may promote the occurrence or non occurrence of occupational work related injuries.

The level of awareness directly impacts on use of safety measures which if adhered to ultimately reduces the risks of occupational health related injuries occurring if the industrial factors like ergonomic factors such as work place and equipment design as well as work postures.

Others influencing factors may include administrative controls such as job rotation, employee work time reduction this gives the employees some ample time to rest which in the long run enhances the employees to be more sober at work and also reduces the likelihood of employees sleeping while at work, introduction of shifts at work institutional factors like provision of safety equipment, availability of policies and guidelines that must be enforced and adhered to by all the employees at work place; the cost of the safety equipment equally has a very big bearing on the ability of the proprietors to provide safety equipments for their employees.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This section presents relevant literature related to the prevalence of occupational related health related injuries among brewery workers.

2.1 Factors influencing use of occupational safety measures

Occupational health hazards are increasing globally. According to Takala (1999) in his study on Global estimates of fatal occupational accidents, he estimated that annually 1.1 million work-related deaths occur.

The factors influencing the use of occupational safety measures may range but not limited to provision of occupational safety wear, installation of appropriate ergonomic designs and safety equipment at working and living environment, low salaries and workers' occupational safety motivation (Zivkovic, 2008). He further cited in his study on influence of biological, psychosocial and organizational work factors on occupational safety motivation, the findings revealed that of the seven offered work incentives, many, 62.8% of the respondents ranked "earnings" as the most important incentive, 49.4% of the respondents ranked "safety of employment" and 36.9% of the respondents ranked "occupational safety" as the third most important incentive in motivating workers to adhere to or use safety measures.

Others factors noted influencing use of occupational safety measures at work place by Zivkovic, (2008) were age of the employee and length of service from 10 to 20 years. Young workers for example had higher level of motivation for occupational safety.

Also many other studies done elsewhere have showed that low education status, low monthly salary, low working experience (5 years or less) in present job, lack health and safety training, sleep disorders, job category and alcoholic drink consumption were common risk factor for work-related injuries (Bill Graves, 2000; Chau, et al 2002; Ashi Bhattacharjee, 2003).

Furthermore Plant (1978) in his study on occupation and alcoholism: cause or effect? A controlled study of recruits to the drink trade; he noted that in One hundred and fifty male manual recruits to Scottish breweries and distilleries who were interviewed and compared with similar men in lower risk jobs it was found that the alcohol producers reported poorer employment records and were significantly heavier drinkers than the controls.

Consumption of alcohol generally has been known to impact health and decision/judgmental ability of individuals when acting on their roles and responsibilities. According to ILO (2003), alcohol is reported to decrease performance and reaction time and considerably increases risk for harm to self and others.

2.2 Types of occupational health related injuries at work place

The common occupational related risks at work place are classified into physical, chemical, physical, biological or ergonomic hazards. The chemical hazards may arise from dusts, fumes, vapors and mists. Physical hazards include may include noise; vibration; extremes of temperature which may be heat or cold stress; ionizing radiation for example x-rays; gamma rays; alpha and beta; non-ionizing radiation like electromagnetic fields (EMF); microwaves; light; lasers; ultraviolet (UV) and infrared (IR). Biological hazards may include mold, fungi,

bacteria, viruses, bird droppings and blood/body fluids. Ergonomic hazards may arise from repeated motions in awkward positions or “out of neutral” postures.

According to the Breweries of Europe report (2002) Occupational health and safety hazards associated with brewery operations include Explosion risk, Exposure to physical and chemical hazards, Exposure to noise and vibrations noise arising from transport of raw materials and finished products and from process and service machinery.

The physical hazards common in the brewery industry according to IFC and World Bank Group (2007) include exposure to same-level fall hazards due to slippery conditions, the use of machines and tools, the handling of glass bottles, and collisions with internal transport equipment, such as forklift trucks. Mills, mixers, grinders, augers and conveyors are potential hazards and may catch fingers, hair, and clothing. Eye injuries are a particular risk prevalent in bottling operations. In the same report the explosive risk common in the brewery industry was mainly organic dust coming from grain storage, milling, and transport operations.

According to the Brewers of Europe (2002) report, it's noted that brewery employees are mainly exposed to physical related risks which are typically attributed to heavy manual lifting and carrying crates of bottles and other raw materials; due to recurring work as well as packing and cleaning, and poor work postures caused by inadequate workstation and process activity design.

In a study by Jinky (2008) prevalent hazards in industries were mainly physical hazards. These were noise, vibration, and extreme temperature. Regarding chemical hazards, workers in all small-scale companies were exposed to particulate matter, its most prevalent form being smoke (100%). Eighty-nine percent of medium and large-scale companies had similar conditions, with

the most common particles being dust and fumes, respectively. No biological agents were present in any company of any size.

2.3 Causes of occupational health related hazards

The causes of occupational health related injuries vary from one work place to another. In a study by Takele (2005) on assessment of prevalence of work related injuries among small and medium scale industrial workers in north Gondar zone, Amahara regional state in Addis Ababa, Ethiopia he found out that the significant contributing factors for work related injuries in both industries were young age(<30 years) [adjusted OR: 1.41, 95 % CI: (1.03-1.93)], job categories, 5 years or less in the present job [OR: 1.53, 95 % CI: (1.12-2.08)], working 48 hours or less per week [OR: 0.68, 95 % CI: (0.49, 0.94)] ,workplace supervision [OR: 0.61, 95 %CI: (0.45, 0.83)] ,sleep disorder[OR: 1.49, 95 %CI: (1.04,2.14)] and job satisfaction [OR: 0.59, 95 %CI: (0.43,0.83)] .

According to study done in eleven urban industries in Addis Ababa, hit by or against object and fall were the commonest causes of work-related injuries (Aberra, 1988). Findings from textile factory study in Addis Ababa, demonstrated that the most frequent causes of work-related injury were machinery 42(29.4%), hit by or against objects 29 (20.3%) (Elias,1991). Department of Environmental Health of Ministry of Health of Ethiopia reported that striking (25.5%), falling (12.8 %) and flying objects from machines (8.5%) were the major causes of work related injury (MoHE, 1996).

The literature on the prevalence of occupational health related in brewery processing industries is generally limited.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the study area, the study subjects, the dependent and independent variables, the sample size, the sampling procedure employed, the data sources and the study tools that were used for data capture, data management and analysis. This section also captures the ethical issues and the anticipated study limitation.

3.2 Study area

The study was conducted in Bralirwa industry which is the largest brewery and soft beverage company in the Republic of Rwanda. The Bralirwa brewery is located in Gisenyi approximately 117 kilometers (73 mi), by road, west of Kigali, Rwanda's capital city. Bralirwa industries employees many workers than any other industries and the information /data collected from respondents was sufficient to answer my study objectives.

3.3 Study design

This was a descriptive cross sectional study employing both quantitative methods of data collection and analysis.

3.4 Sources of data

Quantitative data was collected on aspects of the awareness among the brewery employees on occupational health risks, occupational safety measures used by the brewery employees, factors influencing use of occupational safety measures and types of occupational health related risks faced by the brewery employees using the semi structured questionnaire.

Observational check list was used to capture information on the hazards with the brewery environment like presence of excessive heat, dust, noise, warning signs or safety rules, use of the necessary personal protective equipment, presence of poorly installed electric wires or unguarded machinery or equipment and availability of copies of the most important safety and occupational health regulations

3.5 Study population

The study population was brewery employees of Bralirwa processing industries in Gisenyi Rwanda. The respondents for the study were employees' directly involved beer production

Inclusion criteria: All employees directly engaged in production process in Bralirwa processing industries in Gisenyi Rwanda.

Exclusion criteria: All Employees not engaged in the production process were excluded in the study because of less risk they are exposed to.

3.6 Sample size estimation

Yamane formula for sample size was used to calculate the sample size:

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

where n = the number of respondents required in this study.

Where n = the total number of respondents required for this study

N = is the population size of the workers from Bralirwa industry which is equal to 500.

e = is the level of precision given as 5%= 0.05

From computation above the sample size is given by: 222 respondents. However, the researcher was only able to access 220 respondents. This number constituted the employees who worked at production section of whom formed the respondents of interest in this study.

3.7 Sampling Procedure

A list of 220 employees working in the processing was obtained from the human resource. All the 220 employees in the production section were considered because the employees in this department/section was finite.

3.8 Study variables

3.8.1 Dependent variables

The dependent variables were;

- The occupational health related injuries suffered by the employees in the last 12 months

3.8.2 Independent variables

The independent variables were:-

- Individual factors: - Age, Sex, education level, behavior of workers, duration at work, level of education, level of experience at work
- Working environment –Ergonomics factors, supervision of work, house keeping
- Health safety measures -Protective gears, safety guidelines, training of workers, policy formulation.

3.9 Data Collection Tools

Quantitative data collection methods were employed. A semi-structured interviewer administered questionnaire and observational check lists were used to collect data. The questionnaire was designed in English and translated into local dialect-Kinyarwanda (the most commonly used local language in Rwanda). Interviews were conducted in either English or Kinyarwanda

3.10 Quality Control

3.10.1 Preparations for Data collection

The researcher made preliminary visits to *Bralirwa brewery* to introduce the study, explain the study objectives and get acquainted with the ethical procedures of conducting research at the factory.

3.10.2 Training of research assistants

Four research assistants underwent a three days training in data collection. The morning session of the first day, focused on the problem statement, objectives and methods. In the afternoon the training focused on the consent process and the questionnaire. There were role plays on how to use the questionnaire to enable research assistants understand the tool in more detail. On the second day the questionnaire was pre-tested at soda beverage factory in Kigali. Each research assistant pre-tested the questionnaire with five participants. There was a debriefing session in the afternoon with emphasis on what should possibly be changed and other challenges met during the pre-test. The questionnaire was adjusted in the morning session of the third day and a question and answer session held in the afternoon after which logistical issues were addressed and the team was well prepared and ready for data collection.

3.10.3 Pre-testing

The Data collection tool was pre-tested by the principal investigator and research assistants at soda beverage factory. The soda beverage factory was used because it was considered to have characteristics that similar to the beer brewery factory. The data collection tools were revised after the pre-test and the final data collection tool formulated.

3.10.4 Field editing of data

Each questionnaire was checked for completeness by the research assistant at the end of each interview. The researcher cross checked the questionnaires after data collection and made observations for corrections. The questionnaire completion rate was 100%.

3.10.5 Quantitative data management

Quantitative data was checked for completeness, cleaned and entered in SPSS Version 17 Software. Data was validated for errors that could have occurred during data entry, coded (Outcome variable was coded as 1 when present and as 0 when absent) and exported to Stata 10.0 for analysis.

3.10.6 Quality Assurance

Quality assurance was done using the following criteria;

- The research assistants were trained on the study objectives, effective use of the data collection tools and good communication skills.
- The data collection tools were pretested to ensure clarity and accuracy in collecting the intended data.
- The questionnaire was translated to Kinyarwanda to ensure accuracy of data collected in local dialect.
- The research assistants were well supervised during data collection and ensured that correct procedures were followed.
- Observational checklists were prepared by the researcher.

3.11 Plan for data analysis

3.11.1 Quantitative data analysis

Data was analyzed using Stata 10.0 statistical package. The general characteristics of the study population are described using proportions for categorical variables. To estimate the proportion of employees using occupational safety measure and the numbers of employees who reported to have ever got occupational health related risks were established and expressed as percentages.

To assess factors associated use of safety equipment at work, the observational check lists were used. Also a semi structured tool was used to capture information on factors mentioned by the employees that they thought influenced use of safety equipment. Frequencies and percentages were generated and presented in tabular format and where possible the findings were also presented in form of graphs and figures.

3.12 Ethical Considerations

Approval to carry on the study was sought from IHSU in collaboration with brewery industries in Rwanda. Ethical aspects also taken into account to the respondents to whom explanation of the purpose of the study and possible benefits of the study are explained; the respondents were assured of the confidentiality of their identity and information they gave during this study.

3.13 Limitations of the Study

The following were limitations of the study

The study was limited by lack of willingness to give information regarding the work related injuries in brewery factory and also limited time available for respondents to be interviewed

3.14 Plan for dissemination

The study reports will be submitted to the International Health Sciences University School of Post-graduate Studies, as one of the requirements for the award of the Master of Science in Public Health degree. A copy will be given to the management of Bralirwa brewery.

CHAPTER FOUR

STUDY RESULTS

4.0. Introduction

This chapter presents the results from the assessment of the prevalence of occupational health risks and safety measures in brewery factory in Rwanda study. The study findings are presented according to the specific objectives.

4.1. The socio demographic characteristics of the respondents

Majority, 72.7% (160/220) of the respondents were male. Half 50% (110/220) of the respondents were in the age range of 31-45 years. In terms of religious affiliations, the findings showed that a more than three quarters, 86.4% (190/220) of the respondents were Catholics. The findings equally showed most of the respondents 79.5% (175/220) had attained tertiary level of education. Almost half, 47.7% of the respondents were married, and with respect to professional qualification and employment status, less than half 43.2% of respondents were casual laborers and 47.7% of the respondents were permanently employed. The distribution of the socio demographic characteristics of the respondents is presented in Table 1 below.

Table 1: Socio-demographic characteristics of respondents

Variable	Details	Frequencies (N=220)	Percentage (%)
Gender	Male	160	72.7
	Female	60	27.3
Age	15-30	50	22.7
	31-45	110	50.0
	46-60	60	27.3
Religion	Catholic	190	86.4
	Protestant	15	6.8
	Muslim	05	2.3
	Others	10	4.5
Education level	None	0	0
	Primary school	05	2.3
	Secondary	40	18.2
	Tertiary	175	79.5
Marital Status	Married	105	47.7
	Single	90	40.9
	Divorced	05	2.3
	Widowed	20	9.1
Profession	Engineers	30	13.6
	Machine	90	40.9
	Casual laborers	95	43.2
	Security officers	05	2.3
Employment Status	Permanent	105	47.7
	Temporally	20	9.1
	Casual laborer	95	43.2

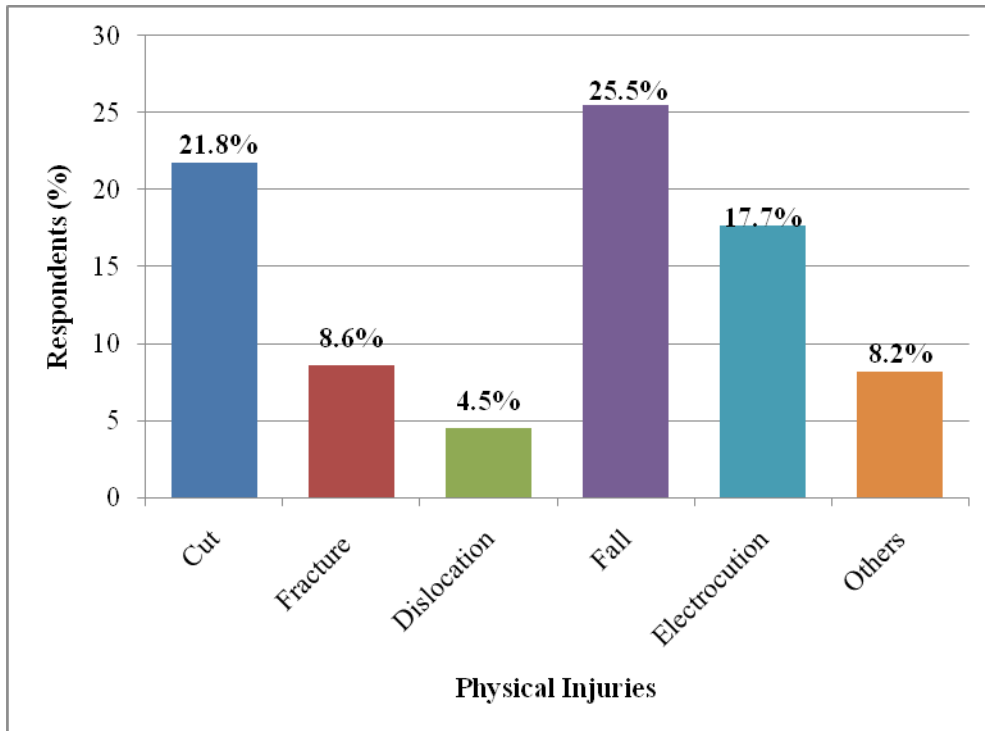
4.2 Types of occupational health related injuries suffered by the brewery employees in the past 12 months

The findings indicated that 86.4% (190/220) of the respondents reported having suffered from work. The work related injuries faced by the brewery employees were a result of physical, ergonomic and psychosocial hazards as shown in Figure 1.

4.2.1 The physical injuries and ergonomic hazards

Of the 86.4% (190/220) respondents who mentioned having ever suffered from physical injuries in the last 12 months, 25.5% (56/190) of them reported falls, 21.8% (48/190) reported cuts, 17.7% (39/190) reported electrocution, only 8.6% (19/190) and 4.5% (10/190) reported fractures and dislocations as presented in Figure 1 below.

Figure 1: Type of physical and ergonomic injuries faced by the respondents at the brewery



From observations carried out at the factory at the time of this study there was no excessive heat in the workplace as no workers were found sweating or without clothing. Similarly the researcher did not feel sudden heat on entering the industry.

Also there was no excessive dust at the work place. The researcher observed the workers eye brows, hair nostrils and clothes were not covered with dust particles.

4.2.2 Chemical and biological occupational health injuries

These were not reported in this research. This could be attributed to probable low awareness of chemical and biological related injuries by the respondents.

4.2.3 Causes of occupational health related injuries

The causes of occupational health related injuries as reported by the respondents are presented in Table 2 below.

Table 2: Causes of occupational health related injuries

Causes	Frequency	Percent
Lack of protective gears	84	38.2
Lack of safety & health education	10	4.5
Discomfort in use of PPE	40	18.2
Poor remuneration	47	21.4
Others	39	17.7
Total	220	100.0

4.3 Occupational safety measures used by the brewery employees at the work place

4.3.1 Personal protective wear

A significant proportion 90.9 % (200/220) of the respondents mentioned that they used personal protective wear. The most widespread safety protective wear used were overalls 95.5% (210/220), 90% (200/220) of the respondents reported using gloves, 86.4% (190/220) of the respondents mentioned helmets. Table 3 provides a summary of the safety protective equipment used by the respondents.

Table 3: Type of protective wear used by Bralirwa brewery employees

Type	Use protective wear	
	Yes n(%)	No n(%)
Gloves	200 (90.0)	20 (9.1)
Ear plugs	160 (72.7)	60 (27.3)
Respirators	80 (36.4)	140 (63.6)
Helmets	190 (86.4)	30 (13.6)
Overalls	210 (95.5)	10 (4.5)
Face shields	100 (45.5)	120 (54.5)
Boots	200 (90.9)	20 (9.1)
Others	30 (13.6)	190 (86.4)

Multiple responses

From the observation checks, it was noted that the employees used the necessary personal protective equipment. Many of the workers were seen putting on safety devices at the time the researcher inspected the premises.

4.3.2 Emergency Facilities

The following were considered important in reducing the occupational health related injuries. These were presence of facilities for emergency showers, first aid kits, warning signals, functional fire extinguishers and trained first aiders. The findings are presented in Table 4.

Table 4: Responses on the availability of emergency facilities

Emergency Facility	Yes	No
First Aid	√	
Fire extinguishers	√	
Warning Signals		X
Emergency doors	√	
Presence of eye showers		X
Trained first aiders	√	
Availability of occupational safety guidelines	√	

√ represents availability and X means none

4.4 Factors influencing use of occupational safety measures among the brewery employees

The factors influencing use of occupational safety measures cited by the respondents included provision of personal protective equipment, training at work place on the use of the safety equipment, regular supervision, job satisfaction, sleeping disorders, alcohol consumption and work related injuries experience. The responses reported are shown in Table 5.

Table 5: Factors influencing use of occupational safety measures among the brewery employees

Factors	Responses	
	Yes	No
	n(%)	n(%)
Provision of personal protective equipment	210(95.5)	10(4.5)
Training at work place on the use of the safety equipment	200(90.9)	20(9.1)
Regular supervision	190(86.4)	30(13.6)
Job satisfaction	180(81.8)	40(18.2)
Alcohol consumption	200(90.9)	20(9.1)
Sleeping disorders	100(45.4)	120(54.6)
Work related injuries experience	190(86.4)	30(13.6)

From the review of occupational records it was noted factory had not held meetings to discuss safety and health factors with the employees during the last six months. It was observed that the last meeting was last held 8 months prior to the study.

CHAPTER FIVE

DISCUSSION OF STUDY FINDINGS

5.1 The socio demographic characteristics of the respondents

Majority of the respondents were male and many of them were in the age category of 31-45 years. The males world over form a majority of the employees especially in industries. This is due to the fact that most of the industrial operations require people who are young and energetic enough to execute activities therein. This finding in study is in line with the Employment to population ratio of Rwanda which reported that males of 15 years plus formed 84.50% as of 2010. Similar findings on employment in the formal sector showed that 55% of salaried workers were in the private sector and 82% were men (Imbonezamuryango, 1992).

In terms of religious affiliations, the findings showed that more than three quarters, 86.4% (190/220) of the respondents were Catholics. The findings are in agreement with those reported in Rwanda Demographic Survey Report, 2010 Rwandan religion scenario is mainly dominated by Christianity with 65% of the total population being Roman Catholics and 9% being Protestants. Most of the Rwandans follow Christianity and practice their indigenous beliefs at the same time. Second after Christianity, the Rwandan religion scenario is dominated by Muslims which comprise of about 1% of the total population.

Majority of the respondents had attained tertiary level of education. This was an indicator that the literacy level of the respondents was high. This finding is agreement with the findings in the Rwanda Demographic Survey Report, 2010 which shows that only 21 percent of men have attended post-primary/vocational, secondary, or tertiary education and about 16 percent of women have done so.

Almost half, 47.7% of the respondents were married, this finding slightly higher than the marital status reported in the Rwanda Demographic Survey Report, 2010. The Demographic survey findings reported that 35.1% and 34.1% of the females and males were married respectively.

With respect to professional qualification and employment status, less than half of respondents were casual laborers.

5.2 Types of occupational health related injuries reported by the brewery employees in the past 12 months

The findings indicate that at least more than three quarters of respondents had ever suffered from occupational health related injuries. The most common injuries were mainly physical injuries and ergonomic hazards. The most prevalent physical injuries were the falls and cuts, fractures and dislocations.

4.3 Occupational safety measures used by the brewery employees at the work place

Based on the study findings, more than three quarters of the respondents used protective wear. The main occupational health safety wear used by the respondents were gloves, ear plus, helmets, overalls and boots.

Other safety measures included availability of emergency facilities. The first aid kits, fire extinguishers, trained first aiders and occupational health safety guidelines were other safety measures found to be available at the brewery. This was an indicator that in case of an accident

at the work place the first aid kits can be of importance and fact that there were trained first aiders, means that they can respond quickly to offer first aid to affected employees.

4.4 The factors influencing use of occupational safety measures among the brewery employees

The factors influencing use of occupational safety measures reported by the respondents included the provision of personal protective equipment, training at the work place on the use of the safety equipment, regular supervision, job satisfaction, alcohol consumption and work related injury experience. These factors may influence use of safety measures either positively or negatively. For the example provision of protective wear at work place, better remuneration positively motivate workers to adhere to use of safety measure besides training at work place on use the safety equipment, regular supervision. This finding is in agreement with the study finding by (Zivkovic, 2008) which revealed that many, 62.8% of the respondents ranked "earnings" as the most important incentive, 49.4% of the respondents ranked "safety of employment" and 36.9% of the respondents ranked "occupational safety" as the third most important incentive in motivating workers to adhere to or use safety measures.

Similar findings of studies done elsewhere showed that low education status, low monthly salary, low working experience (5 years or less) in present job, lack health and safety training, sleep disorders, job category and alcoholic drink consumption were common risk factors influencing use or non use of safety measure (Bill Graves, 2000; Chau, et al 2002; Ashi Bhattacharjee, 2003).

Individual habits like alcoholism, smoking at work place may negatively influence the use safety measures. The findings in this study revealed that about 91% of the respondents admitted that they consumed alcohol. Plant (1978) in his study on occupation and alcoholism: cause or effect? A controlled study of recruits to the drink trade; noted that in One hundred and fifty male manual recruits to Scottish breweries and distilleries who were interviewed and compared with similar men in lower risk jobs it was found that the alcohol producers reported poorer employment records and were significantly heavier drinkers than the controls.

Consumption of alcohol generally has been known to impact health and decision/judgmental ability of individuals to act on their roles and responsibilities. According to ILO (2003), alcohol is reported to decrease performance and reaction time and considerably increases risk for harm to self and others.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

- Physical and ergonomic injuries, falls, cuts, electrocutions, fractures and dislocations were the most prevalent injuries suffered by the employees at at Bralirwa processing industries Gisenyi, Kigali Rwanda

- Most of the workers used personal protective wear. Overalls, gloves and helmets were the widespread used personal protective wear at Bralirwa processing industries Gisenyi, Kigali Rwanda

- No regular meetings held to discuss held meetings to discuss occupational safety and health factors with the employees during the last six months as the records observed indicated that the last meeting was last held 8 months prior to the study.

- The major emergency facilities at Bralirwa processing industries were first aid kits, warning signals, availability of functional fire extinguishers and human resource like trained first aiders.

- The factors noted to influence use of occupational safety measures at Bralirwa processing industries included provision of personal protective equipment, training of the workers on use the safety equipment, regular supervision, job satisfaction and alcohol consumption

6.2 Recommendations

Based on the findings of the study the researcher recommends the following issues to be implemented by the management of Bralirwa industries.

1. The management in liaison with external experts should organize regular training and sensitization programs for the workers on key occupational health and safety issues like the use of protective gears and their role in ensuring their use.
2. The industry management should carry out regular OSH assessments and meeting as required by national law and follow up on risks identified during the assessment. This will help them to understand the magnitude of occupational health related injuries at the brewery and guide the management on appropriate interventions to put in place
3. Consumption of Alcohol should be prohibited at workplace in order to prevent health and safety hazards. This is because alcohol is reported to decrease performance and reaction time and considerably increases risk for harm.
4. That supervision should be tightened to ensure that all workers at the job put on personal protective equipments. This will help to reduce and prevent occurrences of work related injuries.
5. The management should sustainably provide personal protective wear to all the employees including supervision and enforcing use of personal safety wear by all workers.

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APPENDICES

Appendix 1: Introductory letter

INTRODUCTION

This study is about assessment of the prevalence of occupational health related risks and use of safety measures among employees in Bralirwa processing industries in Kigali Rwanda . Professional confidentiality of the identity and information will be strictly respected. Your collaboration will contribute to the promotion of the understanding, employee's knowledge about occupational health and safety at work place.

I request that you respond with honest.

Thank you.

Edward MBONIGABA

Semi –structured questionnaire

Questionnaire identification number

1. Name of interviewer
2. Sex.....
3. Age.....
4. Marital status.....
5. Level of education.....
6. Date of interview:

Section one: demographic/ individual information.

1. Gender

- a. Male
- b. Female

2. Age 15-30

30-45

45-60

3. Religion

a. Orthodox

b. Catholic

c. Protestant

d. Muslim

e. Others specify.

4. Educational level

- a. Illiterate
- b. Can read and write
- c. Primary school
- d. Secondary school.
- e. Tertiary

5. Marital status

- a. Married
- b. Single
- c. Divorced
- d. Widowed
- e. Separated

6. Profession/position held

- a. Engineers
- b. Machine operators
- c. Casual laborers
- d. Security officers

7. Status of employment.

- a. Permanent
- b. Temporary
- c. Causal laborer

Section two: Information on workers behavior

8. Do you drink alcohol?

- a. Yes
- b. No

If yes, how often?

- a. Every day
- b. 1- 4days aweek
- c. Occasionally

9. Do you have any sleeping disorders?

- a. Yes
- b. No

If yes what causes it?

10. Are you satisfied with the job you do?

a. Yes

b. No

11. Are you provided with personal protective equipment?

a. Yes.

b. No

If yes, do you use them? Yes

No

If yes what type?

a. Gloves Yes No

b. Ear plug Yes No

c. Respirators Yes No

d. Helmet Yes No

e. Overalls Yes No

f. Face shield Yes No

g. Boots Yes No

h. Others, specify Yes No

11. What are your reasons for not using personal protective equipment? (Circle the right answer)

- a. Lack of protective gears.
- b. Lack of safety and health education.
- c. Not comfortable to use/ causes irritations
- d. Decrease work performance.
- e. .Other, specify _____

Section three: Work environment information

12. Are you regularly supervised at your workplace?

- a. Yes
- b. .No

13. Do you get training at workplace on how to use equipment?

- a. Yes
- b. .No

14. Have you had an incident at job that resulted in an injury to you in the last two weeks?

- a. Yes
- b. .No

15. Have you had an incident at job that resulted in an injury to you in the last 12 months?

- a. Yes

b. No

If yes how many times?

a. Once

b. More than once

16. What type o accidents do you experience at your factory?

a. Cut Yes No

b. Burn: Yes No

c. Fracture: Yes No

d. Dislocation: Yes No

e. Fall: Yes No

f. Ear injury: Yes No

g. Electrocutions: Yes No

h. Amputation: Yes No

i. Other, specify _____

17. What were you doing at the time of injury?.....

a. Operating Machinery Yes No

b. Hit by Falling objects: Yes No

- c. Electricity shocks Yes No
- d. Fire out break: Yes No
- e. Acids and hot substances: Yes No
- f. Falls: Yes No
- g. Lifting heavy objects : Yes No

18. The time at which accidents occurred (tick the best choice)

- a) 8 am- 12pm
- b) 1pm- 6pm
- c) 7pm 11pm
- d) 12am- 8am

19. Body part injured (tick)

- a) Head
- b) Chest
- c) Limbs
- d) Legs

20. Do you work in shifts?

- a) Yes
- b) No

21. Safety measures in the factory

- a) First aid Yes No
- b) Fire extinguishers Yes No
- c) Eye showers Yes No

d) Warning signals Yes No

e) Emergency showers Yes No

f) Trained first aiders Yes No

Appendix 2: Observational checklist for assessing the work environment

Checklist for observation of working Environment in Bralirwa industries of Rwanda

Checklist identification number: _____

Name of industry _____

Address : Kigali and Gisenyi

Total number of employees directly involved in production processes _____

Hazards in working environment

1. Is there excessive heat in the workplace? 1. Yes 2. No. A yes requires that a worker is found sweating when naked or with light clothing; if investigator feels as sudden heat wave when entering into the industry.
2. Is there excessive dust in the workplace? 1. Yes 2. No. A yes requires if the investigator experiences sudden sneezing upon entering the industry or if the worker's eye brows, hair, nostrils and cloths is observed by investigators to be covered with dust particle.
3. Is there excessive noise in the workplace? 1. Yes 2. No. A yes requires that it difficult to communicate with nearby worker without shouting.
4. Is there warning signs or safety rules? 1. Yes 2. No. A yes requires no lack of such arrangement at inspection around.
5. Do the employees use the necessary personal protective equipment? 1. Yes 2. No. A yes requires no lack in use of safety devices seen at inspection around.
6. Does all production equipment have the appropriate protective arrangements? 1. Yes 2.No .A yes requires no lack of such arrangement (poorly installed electric wire or unguarded machine or equipment) at inspection around.
7. What is the most dangerous incident in the industry during the last 12 months, and any preventive measures been implemented? 1. Yes 2. No. Attainment of yes requires specification of the incident and preventive measures.
8. Does the industry have copy of the most important safety and health regulations? 1. Yes 2.No. A yes requires a copy of the regulation.
9. Does the industry have of health and safety personnel? 1. Yes 2.No. Attainment of yes requires either implementation as result of initiative from health and safety personnel or written program for action worked out with them.

10. Does the industry follow written health and safety plan for action in the workplace? 1. Yes
2.No.A yes requires completion of at least one of the measures in the plan.
11. Does the industry have meetings to discuss safety and health factors with the employees in the last six months? 1. Yes 2.No. A of yes requires minutes with written conclusions.
12. Are training needs considered in connection with new employment, equipment or other changes? 1. Yes 2.No. A yes requires an example of training given as a consequence of a change.
13. Does the industry have first aid equipment? 1. Yes 2.No. A yes requires that first –aid equipment be available in the production area and that content be as prescribed

Appendix 3: Study Budget

Item cost

items	number	unit cost @	total cost
Note books	4	2,500/=	10,000/=
Pens	1box	10,000/=	10,000/=
Pencils	1box	5,000/=	5,000/=
Markers	1 box	10,000/=	10,000/=
Paper	4 realms	12,000/=	48,000/=
Secretarial services			100,000/=
Sub-Total			183,000/=

Data collectors' training costs

ITEMS	NUMBER	UNIT COST @	DAYS	TOTAL COST
Trainer	1 Person	50,000/=	2	100,000/=
secretary	1person	10,000/=	4	40,000/=
Telephone calls	Airtime for 2 persons	5,000	4	40,000/=
Sub-Total				180,000/=

Pre-testing

ITEMS	NUMBER	UNIT COST @	DAYS	TOTAL COST
Supervisors	2	30,000/=	2	120,000/=
Data collectors	4	15,000/=	2	120,000/=
Sub-Total				240,000/=

Data analysis

ITEMS	NUMBER	UNIT COST @	DAYS	TOTAL COST
Data entry	1	70,000/=	3	210,000/=
Data analysis and interpretation	1	100,000/=	2	200,000/=
Sub-Total				410,000/=

GRAND TOTAL = 1013000

Budget Justification

The budget above shows the study costs with detailed costs for the Supervisors, Research Assistants and other participants. The costs are quoted in Ugandan shillings.

Note books, paper and other stationery will be required as per the budget since a lot of writing will be done during the training, pre-testing. The stationery will also be used in the dissemination of data collection and analysis plus key informant interviews.

Trainers and participants who shall be providing skilled labour and more so they are not below senior section certificate, and there are to work intensively for 4 days, the above remuneration is fair.

Pre-testing, as a key component will need to be done accurately for 4 days hence the above money is data collection, transportation, and statisticians.

Dissemination of the findings is a very important and vital part of this research it's therefore deemed necessary to give a feed back to the key stake holders so that they can take action and implement the necessary recommendations.

The Total Cost for the Study is One Million, thirteen thousands Shillings only (1, 013,000/=).

Appendix 4: Work Plan

Activity	Period												Person(s) responsible	
	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Fe		

												b	
Proposal writing and approval	*	*	*										PI & Supervisor
Research Tools development			*	*	*								PI
Research tools pre-testing					*								PI, data collectors
Data collection					*	*							PI, data collectors
Data analysis and interpretation		*	*				*	*					PI
Report writing									*				PI
Final presentation										*			PI
Dissemination											*	*	PI

PI: Principal Investigator