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**Occupational Safety and Health Practices, Challenges and
Improvement Strategy in Tannery Industries: A case of Ethio-
Leather Industry PLC (ELICO) in Reference to Awash and
Abyssinia Tanneries**

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**Addis Ababa, Ethiopia
June, 2021**

**Occupational Safety and Health Practices, Challenges and Improvement Strategy
in Tannery Industries: A case of Ethio-Leather Industry PLC (ELICO) in
Reference to Awash and Abyssinia Tanneries**

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**A Thesis submitted to
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Engineering (Industrial Engineering Stream)**

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Addis Ababa University

Addis Ababa Institute of Technology

School of Mechanical and Industrial Engineering

This is to certify that the thesis prepared by: Fitsum Ambachew, entitled: **“Occupational Safety and Health Practices, Challenges and Improvement Strategy in Tannery Industries: A case of Ethio-Leather Industry PLC (ELICO) in Reference to Awash and Abyssinia Tanneries”** and submitted in partial fulfillments of the requirements for the degree of Master of Science (Mechanical and Industrial Engineering) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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DECLARATION

I hereby declare that the work which is being presented in this thesis entitled “Occupational Safety and Health Practices, Challenges and Improvement Strategy in Tannery Industries: A case of Ethio-Leather Industry PLC (ELICO) in Reference to Awash and Abyssinia Tanneries” is original work of my own and has not been presented for a degree of any other university and all the resources of references used for the thesis have been duly acknowledged.

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Abstract

The magnitude and severity of work related accidents and health problems are increasing worldwide and even worsen in developing nations like ours. This is mainly due to poor OSH practice and policies. In Ethiopia, only very few researches were conducted in regard to OSH practice of tanneries and those studies covered only one aspect of OSH, focusing only on the health aspect or the safety issue lacking an inclusive approach to address the challenges. In addition, consideration of performance and productivity aspects of tannery workers in line with the OSH practices, challenges, improvement as well as in depth analysis to technology (tanning machinery) aspects were also overlooked. Importantly, the studies have not addressed an integrated improvement strategy that should be developed after analyzing existing OSH practices. Hence, this study aimed to assess OSH practices, challenges and improvements in two leather tanneries in Ethiopia, Awash and Abyssinia tanneries in a holistic approach by addressing the previous gaps. A descriptive survey was conducted at Awash and Abyssinia tanneries of ELICO over a study period of (2011-2012) E.C.

A comprehensive questionnaire, structured interview and direct observation were employed to acquire primary data. For secondary data review of company records, manuals and formats besides an in-depth review OSH studies in global and Ethiopia tannery industries were made. A representative sample of 223(44.33%) drawn from the target population and questionnaires distributed via random sampling from which 208 (93%) of them were used. Quantitative data was analyzed through descriptive and inferential statistics, SPSS version 20.0 was adopted for analysis. Data from interview, secondary data and observation were analyzed qualitatively. From the study participants 65.4% sustained injury and 67.8% had work related illness at least once within the study period. A total of 733 sick leaves, 503 absentees and 176 hospitalization days were reported due to injuries and illness. Cut, abrasion, falling, eye injury, wound and suffocation found to be the major accidents, while backache, headache, respiratory diseases, skin complications, dizziness, asthma, muscle related problems and allergy were the major illness observed. The most commonly affected body parts were the hands, fingers, backbone, leg, toe and the knees. The identified etiologies for occupational illness were airborne contaminants, hazardous chemicals, working for long duration in standing and sitting positions, lack of ventilation, bad smell, tedious job, raw hides and skins. Whereas, wet and slippery floors, poor layout, lifting heavy objects, unsafe tanning machineries, improper manual handling, toxic chemical contact, and dust were major predisposing factors for job-related injuries.

Industrial injuries were significantly correlated with gender, educational level, work experience, salary and work unit, while work-related illness showed significant association with age, educational level, service time and working unit. Female workers are more likely to face injuries than their male counterparts. Moreover, Respondents who have been working for more years (>15 Yrs.) have almost half less exposure to industrial accidents and 2.5 times more vulnerable to occupational illness than respondents with less experience.

The findings indicate that the OSH practice of the case tanneries is not in accordance with what has been defined as OSH “best practices”. Hence, a continual improvement strategy is forwarded to advance the OSH practice of the case tanneries. Conclusions, recommendations and future research directions were also forwarded.

Key words: *Tanning Industry, OSH, Practice, Occupational, Accidents and Diseases, Productivity, Factors, Tanneries, Improvement*

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List of Acronyms

COMESA- Common Market for Eastern and Southern Africa

EC-Ethiopian Calendar

ELICO-Ethio-Leather Industry PLC

ETP-Effluent Treatment Plant

FDI- Foreign Direct Investment

GDP-Gross Domestic Product

GTP- Growth and Transformation Plan

HSE-Health and Safety Executive

ICT-International Council of Tanneries

ILO-International Labor Organization

LIDI- Leather Industry Development Institute

MOLSA-Ministry of Labor & Social Affairs

MOTI- Ministry of Trade & Industry

OHSAS-Occupational Health & Safety Assessment Series

OSHMS-Occupational Safety & Health Management System

PLC- Private Limited Company

PPE- Personal Protective Equipment

R & D-Research & Development

SPSS- Statistical Package for Social Science

UNIDO-United Nations Industry Development Organization

USEFI-United States Educational Foundation in India

WHO-World Health Organization

CHAPTER ONE

1. INTRODUCTION

1.1. Background and Justification of the Study

Occupational Safety and Health (OSH) is a specialized field that promotes and maintains physical, mental and social well-being of workers, and it prevents employees from being injured or becoming sick due to hazardous work process and work environment (Goldstein, et.al, 2001; Abera & Yeshmebet, 2020). The severity of accidents, hazards & health allied problems in relation to work place is increasing in proportion to the globally escalating work force. Along with the latest estimates provided by the International Labor Organization (ILO; Kashyap, 2021) that somewhere 2.3 million working people around the world capitulate to occupational accidents or diseases every year; this relations to over 6000 fatalities every single day out of which over 350,000 are caused by occupational accidents and close to 2 million by work-related diseases. Occupational accidents kill nearly 1,000 people every day and work-related diseases provoke the death of approximately 5,400 individuals. The severity in magnitude of work related accidents, hazards and vulnerabilities are worse in developing nations as compared to the developed ones and worst in Sub-Saharan nations. The job-related fatal injury rates are 3–4 times higher in developing countries than the developed ones (Eijkemans, 2004 as cited in cited in Eshete, 2020). This is also justified in another report of (Takala, 1999), in Sub-Saharan African countries about 54,000 case fatality and approximately 42 million occupational accidents happen annually that results in at least 3 days absenteeism from work of every employees. These escalate the work related accident in the region to 16,000/100,000 labor force and raises the mortality rate to 21/100,000. Ethiopia, as part of a developing nation, encompasses numerous occupational accidents and work-related morbidity and mortality despite deficient data. In Ethiopia, based on recent data, the fatal occupational accident rate is 5,596 per year with a fatality rate of 21.5/100,000 workers and an accident rate of 16,426/100,000 workers (Kassu & Daniel, 2016). Several studies emphasized that occupational safety & health (OSH) received less attention in developing nations and its significance is often neglected in these regions. This is because, the degree of awareness in occupational safety & health concept in developing nations is low compared to the developed ones. As indicated on the study conducted by Teklit (2016) employers in developing nations mostly focus on the profit they earn and less concerned on the

wellbeing, health and safety of their employees neglecting the overall adverse consequences. Lack of proper occupational safety & health practice within industries has negative impact on employees' welfare increasing worker's susceptibility to occupational accidents and hazards, which undeniably affect workers performance and productivity. Different literatures and reports emphasize OSH's substantial impact on manufacturing industries productivity outcome. Likewise the impact of OSH on productivity stems from different ground that affects both the employer and employee. As reported by, International Council for Tanners (ICT) and indicated by the study on tanneries from Bangladesh OHAS crisis increases the cost of the organization due to the replacement of injured workers, medical compensation, replacement or repair of damaged machinery, reduction of the quality of work and efficient production and negative effect on employee's self-esteem (ICT,2013; Atiqur, 2014). Moreover, the study of Azom.et al., (2012) publicized that numerous occurrences of injury, death, frequent absenteeism and huge compensation costs that characterized most developing nations are worries to the country's economic development. The study reflected that, these is mainly because of the implications of unhealthy and risky working environment that led to reduced labor productivity within the country and have the tendency of retarding economic growth in the long run. Regardless of the large workforce absorption and employment opportunity of manufacturing industries the severity of exposure to work related hazard and accidents is high. According to ministry of labor and social affairs of Ethiopia (MOLSA, 2014), manufacturing industry is the most unsafe work place, which is mainly due to lack of safety leadership, nature of the industry and lack of enforcement of labor proclamation.

As part of the manufacturing industry, working in tanneries also has its own adverse impact on employee's wellbeing due to increased susceptibility to various workplace hazardous exposures and accidents. Even though tanning industry appears to be affected by automation, human power has significance role for its success. Whereas, employees in tanning processes frequently meet physical and chemical hazards (Karakuzu and Elmal, 2019). According to the study made on Khartoum tanneries OSH issues associated with the operation of leather processing facilities primarily include exposure to chemicals, biological hazards and Physical hazard (*Fadwa, 2017*). The process of converting hides and skins into leather is termed as tanning process. The process of tanning requires consumption of enormous quantities of water and chemicals, which

discharges pollutants to the surrounding environment. Therefore, if not treated to a certain degree can negatively affect the health & wellbeing of workers. OSH practice is still at embryonic stage in most local manufacturing firms of Ethiopia and in particular in the tanning industry. In addition to lack of literature in the area of work related hazards & accidents among industrial workers of Ethiopia there is also inadequacy of studies among OSH aspects of tannery industries.

Hence, this study tried to assess the practice & challenges of OSH in ELICO (Awash & Abyssinia tanneries) through in-depth investigation of major industrial accidents and diseases; impairing practices; associated causes, factors and costs, management commitment, employee awareness & involvement; technology (machine & equipment safety) as well as impact on employee productivity in an integrated manner. Based on the findings of the study an OSH improvement strategy suitable for the tanning industry which supports the case tanneries as well as, policy makers, sector institutions & other tanneries has been developed.

1.2. Statement of the Problem

Industrial safety and health in work life has still alarming figures around the sphere. There are around 340 million occupational accidents worldwide and 160 million victims of work-related fatalities annually (Kashyap, 2021). Accordingly, Claudine, et al. (2019), in their article on OSH indicates that every 15 seconds 153 workers have a work-related accident; each day 6300 people die due to occupational accidents and diseases. OSH problems has enormous impact both on employees wellbeing and productivity of firms, as indicated on the study conducted by Eshete, (2020) there were over 313 million non-fatal occupational accidents requiring at least four days of absence from work in 2010 only. In developing countries like Ethiopia, the probability of having work-related injury and illness as well as its overwhelming effects on employee's productivity and economy is much higher than that of developed nations. The major reason for this growth is that majority of the developing nations have fewer adequately effective OSH programs and less sufficiently developed and enforced laws and regulations than the developed ones (Mahamudul et al., 2016). In coherence with this fact, a report of Ethiopian ministry of labor and social affairs MOLSA (2015) stated that from 279 establishments in year 20014/15 a total of 5135 work related accidents were reported and among which 5092(99.16%) were non-fatal. This resulted in a cost of 2,195,960.74 ETB for medical case and an absent of 12,612 work days by injured employees.

The development and high level technology used in the manufacturing industry results in major impact on OSH which requires special precautions to protect the employees. In Ethiopia the OSH policy is generic that no OSH related strict policy standing alone for the manufacturing industries (Kassu & Daniel, 2016). As part of the manufacturing sector the same is also true for the tannery industry. While some manufacturing firms develop their own OSH policy there is still huge gap in the implementation part. Adherence to job-related safety regulations is a huge challenge encountered by many organizations, and this phenomenon has serious complications on both productivity and reputation for an organization (Omogoroye & Oke, 2007). Despite the poor data recording and keeping, workforces employed in the manufacturing sector of Ethiopia are more vulnerable to work-related injuries than other sectors like construction, agricultural, forestry, and fishing. Out of 14,914 establishments, 25,812 workers faced job related injuries among them (56.62%) victims were registered within the manufacturing industries (MOLSA, 2016). As a manufacturing industry, working in tannery industry also highly predisposes employees to different industrial injuries and illness. Different scholars give emphasis for the necessity of OSH for the tanning industry which is included in the category 'Very risky work' where practice of OSH is very essential, as break of safety practices will create health hazard for workers who are directly involved with production (Karakuzu and Elmal, 2019; Goldstein.et al, 2011; Atiqur, 2014). The tannery industry has two conflicting aspects; it brings economic prosperity and also it causes health and safety problems for workers. A report by human rights watch revealed that though tanneries are one of the emerging sectors for trade and finance, they have also adverse effect to the society, environment and worker besides skin, respiratory and other health problems are very common among tannery workers due to the hazardous uses of chemical (Azom.et at, 2012; Human Right Watch, 2012). A study at Khartoum tanneries shown that, employee's health and safety is influenced negatively by poor management of safety practices, bad management attitude towards health and safety, and lack of OSH trainings (Fadwa, 2017). An observational study on Bangladesh, Hazaribagh area tanneries also exposed that in 2010, 13 people have been died from industrial accidents and 30 people have been injured seriously, dearth of awareness both in employees and owners and absence of OSH practices were identified factors for the shocking accidents (Basak et al., 2019).

Besides tannery workers incidence to occupational accidents, they are also vulnerable to variety of health problems. Consequently, studies conducted on tanneries of the globe exposed that

tannery workers suffer from many diseases including respiratory problems, gastrointestinal disease, skin diseases, hypertension, asthma, acute bronchitis, acute gastritis diarrhea, eye problem etc. (Panjakumar et al., 2020; Basak et al., 2019, Atiqur, 2014; Mahamudul et al., 2016). Researches on the area also indicated that there is an association between employee's duration of work exposure in leather industry with their clinical symptoms, work place health status and facilities available for them in the industry (Arunkumar & Rama, 2017; Padma et al., 2016).

Insufficient OSH program has also an extreme effect on the performance of the emergent industrial business in Ethiopia such as tannery factory (Students, 2016 cited in Abera & Yeshmebet, 2020). In line with this, a study conducted on Sheba leather which is located in northern Ethiopia implied that, majority of employees in the leather company were moderately exposed to occupational risks and hazards (48.5%) whereas (24.7%) of the workers were highly exposed to occupational risks and hazards in the industry (Teklit, 2016). These and other studies done in the past directed working in the tanning industry predisposes employees to various injuries and illness thereby affecting their performance. Hence the necessity for implementing effective OSH practices within tanning industries is crucial. The major gaps drawn from past studies are: -

In Ethiopian context some studies have been conducted in relation to OSH within the manufacturing sector but only very few or none researches were conducted on tannery industries OSH practices, challenges and improvement approaches in a comprehensive manner. Since the ramifications of OSH are dependent on the type of work environment, it is vital to study the practices in sector specific manner. Besides those few past studies were not holistic means consider only one or two aspects of OSH in tanneries, such as socio-economic impacts of Bahirdar tannery, Fitsum & Fikirte (2014); Occupational risk exposure, knowledge and safety measures among workers of Sheba leather plc., Teklit (2016); effect of OSH program on organizational productivity on Bahirdar Tannery, (Abera & Yeshmebet , 2020). Another limitation that, since most of the studies were from the discipline of health science their focus of area was mainly on specific health problems of employees working in tanneries by neglecting the safety and other OSH aspects such as, occupational skin diseases and associated factors Seyoum, (2014); respiratory symptoms and risk factors among tannery workers (Innawu, et al., 2019). Importantly, besides lack of thorough analysis on demographic, behavioral and environmental

factors including technology (tannery machinery's) effect on wellbeing of workers, all of them missed to forward a comprehensive OSH improvement approach.

During preliminary study period it was observed that employees of the tanneries with in the case company are highly vulnerable for injuries and illness due to unguarded machineries, uncovered motors; lose electrical connections, wet floors, bad smell as well as other impairing and unhealthy practices. However to analyze the impairing practices, challenges as well as associated factors it requires in depth and updated research.

Therefore, this paper has made an attempt to address and fill those gaps on tanneries OSH practices in a holistic approach by conducting thorough investigation on the magnitude of prevalence of major work related accidents & diseases, body parts affected, impairing practices, challenges, associated causes and predisposing factors, employee's awareness & involvement, leather processing machineries safety, management commitment as well as influence on workers' productivity & associated costs by considering the case tanneries of the study. Finally, an improvement strategy was developed based on the findings of the study.

1.3. Research Questions

This research attempts to answer the following basic research questions:-

- ✓ What are the main industrial accidents and diseases and their magnitude of prevalence in tannery industries, in reference to Awash and Abyssinia tanneries?
- ✓ What are the major factors causing job-related accidents and diseases in tannery industries, in reference to Awash and Abyssinia tanneries?
- ✓ What is the impact of industrial accidents and diseases on employee's productivity of Awash & Abyssinia tanneries?
- ✓ What improvement strategies could be developed in alleviating major causes of accidents and diseases and improving OSH practices of tannery industries, in reference to the case tanneries?

1.4. Objective of the Study

1.4.1. General Objective

The general objective of the study is to investigate occupational safety and health practices and challenges in tannery industries by referring to Awash and Abyssinia tanneries of Ethio-Leather Industry PLC (ELICO) as well as to forward a continual improvement approach.

1.4.2. Specific Objectives

The specific objectives of the study are:-

- ✓ To identify major industrial accidents and diseases and their magnitude of incidence in tannery industries, in reference to Awash and Abyssinia tanneries.
- ✓ To investigate effect of work-related accidents and diseases on employee's productivity of the case tanneries.
- ✓ To pinpoint major causes of job-related accidents and diseases in tannery industries as well as the challenges in reference to Awash and Abyssinia tanneries.
- ✓ To determine level of tanneries management commitment and awareness of employees towards occupational safety and health.
- ✓ To recommend and develop an OSH improvement strategy for tannery industry based on findings of the study.

1.5. Significance of the Study

The importance of the study is primarily identifying and clarifying the specific challenges and seeking for practical solutions might enable the management of the selected tanneries, to recognize where the real problems of OSH resides, the predisposing factors and how they should be tackled or minimized. Second, it can provide the basis for the formulation of pragmatic OSH strategy which addresses specific safety and health needs that can improve the safety, wellbeing, productivity and motivation of employees working in the tanning industry. Third it can help in minimalizing costs incurred due to poor safety & health practices and environment. Moreover, the recommendations forwarded and the improvement strategy developed based on the findings of the study besides the case tanneries will benefit employees, management, sector institutions, policy makers, academicians and most of all important in taking measures to overcome the major

challenges and impairing practices of OSH in other tanneries too through minor amendments. Last but not least, it may serve as a springboard to make further investigation on this area.

1.6. Scope and Limitations of the Study

1.6.1. Scope of the Study

This study focused on investigating occupational safety and health practices and challenges in ELICO in reference to Awash and Abyssinia tanneries) as well as to make improvements. The study is limited to address the practice and associated challenges of occupational health and safety within tanneries of the case company. In particular the study was focused on employees within production, Effluent Treatment Plant (ETP), maintenance and utility, raw hide and chemical store as well as laboratory and quality sections of the case company tanneries, since workers directly involved to the tanning operation are highly vulnerable to job related diseases, hazards, injury as well as other OSH problems. The study made an attempt to address the practice and challenges in relation to common work related accidents and health problem; associated factors and impact on worker productivity; employee level of awareness as well as management commitment and safety aspects of leather processing machineries and equipment's. This was accomplished via examining earlier studies, analyzing their limitations and developing improvement strategy that can fill their gaps. The study uncovered the OSH practices of the case tanneries in line with the objectives of the study for the period of 2011-2012 E.C.

1.6.2. Limitations of the Study

As any research has its own limitations this research has also faced some limitations and challenges. Among them the data collection has took a very long time due to Covid-19. Since the case tannery employees were not working at full labor during the planned data collection period due to Covid-19 pandemic the researcher was forced to be patient and extended the data collection period in order to get the required sample. This also pushed the expected time of finishing the overall study as well as incurred the researcher additional resource and money. Besides since the research under investigation was a sensitive issue it was challenging to get reliable and accurate data. However, these difficulties have been resolved by the use of systematic data gathering and clarification of the purpose of the research, confidentiality of acquired information and triangulation of secondary data. The other shortcoming is that the study

was conducted by taking Awash and Abyssinia tanneries of Ethio-Leather Industry as a target population. Hence, the findings of the study may not be equally valid for other Leather processing factories.

1.7. Organization of the Paper

The study is organized into six chapters. The first chapter consists of the back ground of the study, problem statement and objectives (both general and specific). It also includes research questions, significance, scope, as well as the limitation of the study. The second chapter deals with literature review and theoretical frame work of the study. The third chapter constitutes research design and methodology of the study. The fourth chapter is comprised of data analysis, interpretation and discussion. Chapter five focuses on critical problems identified and improvement strategy for OSH practice of the case company. The final six chapter presents conclusion and recommendations forwarded based on the findings of the study.

CHAPTER TWO

2. RELATED LITERATURE REVIEW

2.1. Introduction

This chapter provides an insight to readers about the theoretical review of the topics under study and contains conceptual structure of the study concerning the theoretical frameworks by which the overall research task is conducted. An in-depth literature review has been explored with regard to OSH practice within the tanning industry as a theoretical and background basis for basic questions and objectives of the research. Thus, the fundamental findings in the existing theoretical and empirical literature have been presented on manufacturing industry OSH practices and challenges in general and for the tanning industry in particular both in the global and Ethiopian context. Hence, the first part of this literature review deals with general concepts and operational definitions, importance, global trend and magnitude of OSH as well as classification of work-related hazards and diseases. The second part deals with major OSH accidents, diseases, their magnitude and associated factors as well as leather manufacturing process flow. The third part goes through issues like OSH performance measurements, economic effect and associated costs as well as impact on productivity. The last part considered the OSH practice, its various improvement approaches and factors affecting its efficiency are also discussed. At last an in-depth review of OSH studies in Ethiopia tannery industries, evaluation of their works and the associated gaps were identified.

2.2. Operational Definitions and Concepts of Occupational Safety and Health

In order to deliver clear and simplified understanding for the readers of this paper, definitions of some technical and operational terminologies in relation to the subject matter under investigation is incorporated below.

According to the International Labor Organization (ILO) and the World Health Organization (WHO), health and safety at work is aimed at: the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention among workers of leaving work due to health problems caused by their working conditions, the protection of workers in their employment from risks resulting from factors adverse to health, the placing and maintenance of the worker in an occupational environment adapted to his or her

physiological and psychological capabilities and, to recap, the adaptation of work to the person and of each person to their job (ILO, 2006).

Analogous to ILO's definition, Premier Occupational Healthcare (2010) stated that, OSH denotes to activities, processes, or procedural strategies to protect and promote the health and safety of workers, which was intended at eliminating all factors, behaviors and conditions hazardous to human health and safety at work. Similarly, based on Vinodkumar (2010), **Occupational Safety and Health Practices (OSHP)** are the strategies, policies, activities and procedures that can be implemented by the organization aiming safety of their employees.

Employment accident is any biological injury or functional disorder faced by a worker as a result of any cause extraneous to the injured worker or any effort he makes during or in connection with the performance of his work (Asfahi and Rieske, 2010).

According to **ILO's 2005 statement**, **Occupational injury** is "death, any personal injury or disease resulting from an occupational accident"; while **Occupational disease** is defined as "a disease acquired as a result of an exposure to risk factors arising from work activity". Hazard is a source, situation, or act with a potential for harm in terms of human injury or ill health and damage to property (OSHA, 2015). In relation to OSH as stated by (Lucas (2001), **Health** is the art and science of preventing disease, prolonging life, promoting physical and mental health, sanitation and personal hygiene, control of infections and organization of health services. **Non-fatal** are injuries not capable of causing death. **Personal Protective Equipment /PPE/** is application of the employee specialized clothing or equipment or worn by workers for protection against health and safety hazards. Personal Protective Equipment is designed to protect many parts of the body like eyes, faces, head, hands, feet and ears. PPE refers to protective clothing, helmets, goggles, or other garments or equipment designed to protect the workers body from injury or infection. Another important terminology with regard to OSH is **Risk**, it is a combination of the probability that a particular outcome will occur and the severity of the harm involved Safety relative freedom from danger, risk, or threat of harm, injury, or loss to personnel and/or property, whether caused deliberately or by accident.

2.3. Literature Review Methodology

In order to gather the relevant literature as a basis for the theoretical and empirical frame work of these study different materials were referred and reviewed. Most of the materials were gathered

from the electronic database. In the process of collecting and identifying the required research resources Google Scholar, MEDLINE, Elsevier, Research Gate, Science direct, Sociological abstracts, EconLit were some of the electronic data bases employed for this study. The timing of most collected resources ranges from early 1980's - 2021, since the concept of OSH gained attention and became applicable with in this time frame.

The researcher attempted to review OSH aspects both in the global as well as in the Ethiopian context. The study methodically enrolled from broader primary concept that tapered down to the specific horizon of the study. Accordingly, common OSH theories and practices in the broad term were searched primarily, then narrowed down to within the manufacturing industry and finally brought down to the scope of the tannery industry in specific terms.

In the process of collecting the study materials key terms and expressions in line with the basic objective of the study were employed in order to get the relevant literature for this research. Terms with key words such as occupational safety, occupational health, manufacturing safety and health, industrial health, industrial safety, occupational safety, employee safety and health, work place safety, work, health, manufacturing safety, tannery health and safety, leather processing and workplace, occupational safety and health management, safety and health, tannery occupational accidents, tannery related diseases, factors/ causes are employed. Besides occupational safety and health impairing practices, effects on productivity, performance, satisfaction, economy, OSH awareness, and safety costs also searched and reviewed. Beyond these key terms and words were exploited coherent with expected measures the researchers can use for this OSH purpose.

Even though, it was tough to include all papers that contributed to OSH practice, the investigator tried to focus on those articles and papers concerned with the basic research questions of the study and to identify their gaps. The core objective of this study was investigating OSH practices, challenges and developing improvement techniques for the leather tanning industry via considering the case company under investigation.

The researcher reviewed articles and scientific journals in relation to manufacturing industries occupational safety and health in general and OSH of tannery industries in particular. More than 400 articles, scientific journals, books, reports, policies, guidelines and manuals were gathered

for the purpose of this research obtained from different sources and designated databases. The collected research materials were sorted out based on their relevance and importance for the subject under investigation. Further refining was performed through abstract and keyword screening process and hence the collected resources were further condensed. At last, the selected and condensed materials were again finalized to the most relevant in view of recent publications, specific relevance, methodology followed, findings as well as conclusion and their recommendations. Finally, the materials that align best with the basic purpose of this study were filtered out and adopted on this research.

2.4. Global Trend and Magnitude of Occupational Accidents and Diseases

About 45% of the world's population and 58% of the population over 10 years of age belong to the global workforce which is 60-70% of the adult male and 30-60% of the adult female population of the world (Christer, 2006). According to ILO (2015) report, every year above 2.3 million women and men die at work from an occupational injury or disease. Over 350,000 deaths are due to fatal accidents, and almost 2 million deaths are due to inevitable work-related ill-health. Also, over 313 million employees are involved in non-fatal work-related accidents causing critical injuries and absences from work. The same report of ILO also estimates that 160 million cases of non-fatal work-related diseases happen annually. These estimates indicate that everyday around 6,400 people die from occupational accidents or disease and that 860,000 people are on the job.

Work-related injuries only make up more than 10 million healthy years of life lost whether to disability or premature death, and 8 percent of accidental injuries worldwide. Besides back pain accounts for the major portion of non-fatal conditions, 37 percent of all back pain worldwide is related to work, resulting in an estimated 800,000 healthy years of life lost, a substantial loss of time from work, at a high economic cost (UNIDO, 2012; Seyoum, 2014).

Even though work related injuries are common problems in today's more competitive and sophisticated industries throughout the globe; the gravity of the problem is more alarming in under developed nations. As evidence of the above statement; among the total expected 3 billion global workforces in 2008 work-related health services were accessible only to 10-15% of them.

In developed nations, the coverage varies between 15 and 90% and in emerging economy countries the coverage extremely brought down to between a few percent and 20% (ILO, 2008).

In general, work-related accident and disease rates are gradually decreasing in most industrialized countries but are level or increasing in under developed nations (Alli, 2014). Many studies also supported this fact that in developing countries OSH consideration has been given less attention Iman (2004) besides, safety management and measurement is at its embryonic stage (Goldstein, et al., 2000; Zewdie, et al., 2011).

Among the various explanations for this fact, there is a general lack of knowledge, attitude and responsiveness on behalf of employees, employer and regulating bodies in developing countries (Ahmad, 2016). Moreover, there is absence of government commitment demonstrated by the incompetence to enforce regulations, policies and legislation (Kassu, 2017). In Africa the issue of OSH has been ignored by most nations and organizations. In line with ILO (2010) report 63,900 work related deaths occurred within the 54 African countries and that an estimated 1,560,000 disabling work injuries followed.

Ethiopia has a regulation statement on Occupational Safety and Health (OSH) since the 1940's and has ratified ILO Convention No 155 of 1981 in 1991 which lead to two major rules. The first one is Labor Proclamation No. 377/2003 and the second one is Labor Proclamation No. 515/2007 on public civil servants. Even though there is no specific OSH policy for the manufacturing sector alone, policy at a national level on Occupational Safety and Health has been established and approved by the Central government. Unfortunately, there is no a separate agency till now which is responsible for employees safety and health at workplace, however the national OSH is regulated and administered under MOLSA (Abera et al, 2016). A report by MOLSA (2012), also exposed that in developing countries including Ethiopia, the risk of having work-related injury is 10 to 20 times higher than that of developed countries. Despite lack of availability of well-organized data recording system with regard to work related diseases and accidents in Ethiopian scenario, the reports of few data sources displayed that work related injuries are aggravating from year to year and total economic losses, social and human crises resulting due to these accidents are huge (MOLSA, 2016).

The above facts confirm the severity of work related injuries and illness despite the advancement of technology and industrialization and hence the necessity for efficient OSH practices within industries.

2.5. Importance of Occupational Safety and Health

Occupational health and safety should gain enormous importance since it is a field that deals about human health and job safety and covers preventive measures and methods against occupational risks. Contemporary studies advocate the importance of safety and health practices that promote economic wellbeing and productivity for both businesses and nations (Law et al., 2006; Marcia and Kit, 2016). OSH Management Systems used by organizations will enhance health and safety of employees, mitigate risks and improve work safety. This will bring many benefits to workers, businesses and nations from the point of socio-economic concerns (Harun and Ender, 2018).

If the society doesn't give importance on occupational health and safety, it costs human misery, fatal tragedy and economic results (Karakuzu and Elmal, 2019; Alli, 2008). Besides, OSH have great significance in the workers work environment because currently human resource is the most appreciated asset that an organization does have and the existence of bad occupational health and safety environment greatly affect the job performance of employees (Decenzo and Robbins, 2004). Despite its huge significance the attention given to OSH especially in developing nations is very less. Even though people are working and spending most of their working hours at the place of work, little attention and resources are devoted to health and safety at work (Michael, 2015). Maintaining employee's health and wellbeing via implementing effective OSH practice has multidimensional importance. A strong economy, high quality of products or service and long-standing productivity are difficult to realize in poor working conditions where employees are unprotected to health and safety hazards (ILO, 2014b). Besides OSH management system enable companies to develop a platform in order to manage today's workplace challenges in relation to high injury and illness, lost work days, increasing OSH regulations, huge penalties, rising worker's compensation costs, costly medical claims, worker retention and employee satisfaction by (Asfahi and Resnik, 2010). Also studies identified that there is a close linkage between OSH management practices and workers moral that OSH implementation among companies leads to improved job satisfaction of staffs and

hence improves organizational productivity (Sembe & Ayuo 2017 as cited in Abera & Yeshmebet, 2020).

Many researchers mentioned why OSH is necessary and its multidimensional prominence. A study performed on nineteen case companies revealed that higher productivity, lower absenteeism, lesser employee turnover, avoiding the cost of trial, meeting customers' expectations and improved employee morale and staff relations are some of the concrete benefits of OSH management (HSE, 2004). Furthermore, Pouliakas and Theodossiou (2010) also listed out the necessity of OSH in modern economies as increasing competition related to the globalization era, the predominance of service oriented industries, the growing job uncertainty associated with labor market flexibility and the shifting demographic composition of the workforce (headed for more female, ethnically diverse and aging employees).

Owing to the above multi-directional implications and benefits, OSH is not a choice for industries rather it has to be an essential part of today's organizations and industries. Especially developing nations like Ethiopia who has poor data management culture in relation to industrial injuries should give enough concern in implementing sector specific OSH initiative.

2.6. Classification of Occupational Hazards

Industrial employees are exposed to a multiple of hazards from physical, biological, mechanical, chemical psycho-social and ergonomic issues which adversely affect workers, coworkers as well as the company (Ahmad, 2016). Almost similar classification was given by MOLSA, accordingly, hazardous chemicals containing neurotoxins, immune agents, dermatologic agents, carcinogens, reproductive, toxins systemic toxins, asthma gens, pneumoconiosis agents, and sensitizers. Moreover, dangers arising from liquids, solids, dusts, fumes, vapors and gases are categorized as chemical hazards. Biological hazards include infectious microorganisms such as viruses and toxins produced by those microorganisms for instance anthrax, bacteria, protozoa as well as animals and animal products that can cause infections, allergy, toxicity and other hazards to human health (Abera & Yeshmebet, 2020). Psychological hazards comprise risks to the mental and emotional well-being of workers, such as feelings of job insecurity, stress, long work hours, and poor work-life balance. Improving workstation psychological health can increase

worker satisfaction, engagement, and productivity; shrink health costs, staff turnover, and lost work time (Sarah Z. Wang & Eva A. Karpinski, 2016 cited in Abera & Yeshmebet, 2020).

Ergonomic hazards are hazards associated with the non-application of ergonomic principles, for example badly designed machinery, mechanical devices and tools used by workers, improper seating and workstation design, or poorly designed work practices (MOLSA, 1997). Physical hazards- Physical hazards include environments of the workers such as heat, cold, loud noise, poor lighting, poor ventilation, vibration, electricity and radiations. In addition unsafe covering & polluted general environment intensify the poor health of the worker further (Ahmed, 2010).

As indicated on the study conducted by Ahmad (2016) mechanical hazards are accidents & injuries normally result from events such as being caught-in, hit by machinery, falling from height and manual handling of loads, slips, trips and falls, tools. Injuries, deaths & damage to the property due to electrocutions & short circuiting and fires resulting from flammable material poorly stocked are common in industries. Moreover, equipment and tools used in manufacturing industries cause vibration hazard. This can cause unresponsiveness, reduce the ability to feel vibrations, heat and cold. Furthermore, it cause the problem in muscle, joint, tendon and back problems (Lindahl, 2008).

Even though different scholars adopt various classifications for work-related hazards their basic concepts are identical and included in the above categories of industrial hazards.

2.7. Major Occupational Injuries and Causes in Manufacturing Industries

As indicated by many researchers, since the manufacturing sector is a complex industry which involves various types of work situations the extents of its accidents are significantly higher than any other sectors in general. In the manufacturing industry workplace accidents cannot be avoided and the accidents are costlier accounting billions of dollars every year (Amirah et al, 2013). While the manufacturing industry is the backbone of any good economy, naturally it involves a large number of hazards. Hence, to keep the bones in shape, it is important for firms to keep their employees safe. Generally, Safe workers are happier, healthier, and more productive (Muthukumar, 2019).

According to Wagenaar and Groeneweg (1987), among the many factors that cause accidents in industries the major ones are less training, lack of supervision, obsolete machinery equipment's, overcrowded environments, emotional stage of the workers, poor layout, disobeying of safety rules and unsuitable working conditions.

There are hazards inherent in every work humankind does and such hazards have different probability to causing accidents, injuries, near misses and diseases (Ana, & Sridhar, 2009).

Occupational accidents have mostly been attributed to two fundamental causes: internal causal factors (dispositional characteristics of the worker), and external causal factors (characteristics of the work environment) (Gyekye, 2010; Kassu, 2017).

Most studies in different countries also publicized that, sleeping disorder, job stress and job dissatisfaction are the major risk factors for the occurrence of occupational injuries among industrial workers (Seyoum, 2014).

Despite limitations on adequate injury recording system and reporting the severity of workplace injuries is also alarming in the manufacturing industries of Ethiopia. From 2011 till 2014, according to national injury report by MOLSA, machine, hand tool, fire and explosive, falling and slippery, miss handling, collisions with objects and work faults cause 75% of injuries. In favor of this fact, an appraisal conducted on Ethiopian manufacturing industries OSH situation revealed that Flying objects, falling, and machinery caused 43% of the injuries. Workplace hazards including unguarded machines, splitting materials, metal sparks, molten metal, excessive heat, and slippery and unlevelled floors contributed to the occurrence injuries in the factories (Abera *et al*, 2016). Among them about 75 % of injuries involved upper extreme, lower extreme, eye and central body resulted in 39 % abrasion, 16% cuts, 13% piercing, 4% burns and 6% eye injury (Hailye, 2016; MoLSA, 2015).

Working more than 48 hours per week, absence of OSH training, sleeping disorder, alcohol intake, job dissatisfaction and lack of PPE's were found to be major factors that lead to the main work-related injuries in Ethiopian manufacturing industries (Yiha & Kumie, 2010 cited in Eshete, 2020). Many research findings pointed out that the factors associated with occupational injuries are classified in to three categories as socio demographic factors, environmental factors and behavioral factors. Empirical findings from a study conducted in Ethiopian manufacturing industries Gebremichael *et al*. (2015); Yitagesu *et al*. (2014); Seyoum (2014); Asrat and Dagachew (2017, also showed that there is significant association between

socio demographic factors (Sex of workers, Age of workers, Level of Education, income and Work experience and mode of employment; work environment (Availability of PPE, Health and safety Training, Hours worked per day, Workplaces Supervision, Presence of danger sign) as well as behavioral conditions (Use of PPE, Job satisfaction, Smoking and Alcohol consumption). Lastly, despite differences for occupational injuries and associated factors inherent to the type of industry, as discussed above there are injuries and causes which are common for most manufacturing industries.

2.8. Process Flow for Leather Manufacturing

Leather tanning is one of the oldest industries in the world which involves the process of treating skins and hides of animals to yield leather, which is more robust and less vulnerable to decay.

Within the leather processing a stable material can be used in the manufacture of a wide range of products. The whole process involves a sequence of complex chemical reactions and mechanical processes (Mostafa & Saha, 2013).

The leather industry is a field covering all the operations carried out until raw materials extracted from animals are made into products by means of human power, machines, and processes (Gülbaş and Karakas, 2016).

Leather production process in tanneries is characterized based on the type of product, chemicals used, water treatment, and machineries engaged and other technical specificity. Different authors classify the steps in producing the finished leather in a slight different ways however the major steps are identical. As indicated on the study conducted by *Fadwa (2017)*, the production processes in a tannery can be split into four main categories. Pre- tanning (hide and skin storage and beam house operations), tanning (tan yard operation), Wet Finishing (post- tanning operations), and finishing Operations.

In the process of generating the final finished leather the raw hides & skins go through different process generating different semi-finished leather. The basic operations in tanning process are illustrated in the Table 2.1.

Table 2.1: Basic operational terminology in finished leather manufacturing

Semi-finished Leather Products	Soaking	The soaking process cleans the excess material on the skin and recovers the soft natural and swollen structure.
	Dehairing Liming	The layers like hair, hair are removed from the inside. During this process, sodium sulphide, sodium hydrosulfide and lime are used.
	Deliming	The excess lime is purified and the ineffective proteins on the skin are solved with the aid of various enzymes.
	Degreasing	The surplus overhead is the removal of oil. In this section, solvent is generally preferred.
	Pickling	For better tanning, it is the process of increasing the degree of deep acidity. It is called a pickle.
Wet-Blue Half Made	Tanning	It is a transformation process against the deep deterioration and stinking which is made pure with the help of the processes made. It can be used in different ways here. (Chrome, vegetable, synthetic, etc.)
Crust Half Made	Re-tanning	It is known as the second tanning process. It is made to make the skin tighter, more durable and plump.
	Dyeing	It is a coloring process. In general, water-based acidic paints are preferred.
Made	Finishing	Finished leather is obtained. Here the abrasive powders, dyed waste is obtained from the surplus excess.

Source: (Karakuzu and Elmal, 2019)

2.9. Major Accidents, Diseases and Associated Factors in Tannery Industries

As part of the manufacturing industry working in tanneries also has its own adverse impact on wellbeing of workers due to various workplace hazards and accidents. The tanning industry suffers from both hazards mutual to most manufacturing industries as well as accidents and diseases specific to its inherent nature of production and process. The major work-related hazards related with the operation of tanning and leather finishing facilities primarily include exposure to chemicals, biological hazards and Physical hazard (Anon, 2007).

A cross sectional study conducted on twenty two tanneries of Bangladesh demonstrated that, tannery workers suffer from many health problems, among them Skin problem, Gastrointestinal problem, Chronic head ache, Respiratory system problem (Asthma, COPD, chronic bronchitis), Cardiovascular problem (Hypertension/stroke/heart disease) are more common.

The same study also exposed that working environment, types of work, way of work, smoking, use of PPE and lifestyle has a great impact on the health of the tannery workers. Smoking and household income of the respondents were found significantly associated with the morbidity of the tannery workers (Islam et al. 2017).

Tanning is one of the most poisonous industries in the world because of the chemicals involved. Among many chemicals used in leather processing, chromium is one of the most harmful chemicals found in the tannery waste and because of its toxic potential it may cause also cancer. An important health risk factor for the tannery workers is occupational exposure to chromium, which is used as a basic tanning colorant (Subodh, 2008). Besides, chromium has potential to bind with skin proteins of tannery workers to produce complex antigens which lead to hypersensitivity (Mahamudul et al., 2016). The main health impacts from chromium are impairment to the gastrointestinal, respiratory, and immunological systems, as well as reproductive and developmental problem (Mary and Saravanan, 2017).

Skin diseases, gastric ulcers, gastroenteritis, respiratory illnesses (asthma), anemia, dysentery, headache, hypertension and lethargy were found as the predominant health problems among tannery workers of Bangladesh tanneries (Mohanta et al., 2012).

Prior to attempting an identification of the solution for occupational accident, it is important to better realize what the elements are or factors that cause's workplace accident (Kassu, 2017). In view of that, as part of the manufacturing industry the tanning industry also shares many of the common causes of accidents of the manufacturing sector; however there are some factors tailored to the leather industry only in line with its specific nature and process of production. As indicated on the study by Islam et al. (2017) working environment, types of work, way of work, smoking, use of PPE and lifestyle has a great impact on the health of the tannery workers.

Many research on the area indicated that one of the major health problems seen among tannery workers is respiratory diseases, in line with this a cross sectional study on occupational risk factors associated with respiratory symptoms among tannery workers in Mojo town, Ethiopia exposed that Sex, employment status, ventilation of working units, absence of occupational health and safety training, and not using personal protective equipment were the factors associated with occupational-related respiratory symptoms (Innawu, et al., 2019).

Smoking and household income of the respondents were also found significantly associated with the injury of the tannery workers. A research conducted on Occupational Health Hazards among tannery workers of Egypt by Amany (2016) shown that, there was a high statistically significant relation between knowledge of workers related to occupational hazards and their practice. Moreover, there was also statistically significant relation between knowledge of employees related to occupational health hazards and their educational level as well as monthly salary.

Most of the hazards in tanneries arise from scarce or unavailability of worker safeguards. These include: Slips and falls on improperly drained floors, injury from heavy machinery or flaying knives, buried in lime and the most dangerous part of modern tanneries are handling chromium. In humans, chromium causes a myriad of ailments depending on how it is absorbed (Anon, 2007; Fadewa, 2017). Lack of safety training, no awareness on safety measures and failing to use personal protective equipment had shown a significant association with an increased prevalence of skin diseases (Seyoum, 2014). In conformity with the above, an investigation conducted on Sheba tannery outlined that there was significant association between occupational risks and hazards exposure and age. There was also significant association between knowledge of occupational risks and hazards, age and educational status of employees (Teklit, 2016).

Again negligence of using personal protective equipment entitled safety boots, gloves and goggles have significant effect on higher occurrence of asthma, eye problems and nail discoloration. Besides, working areas of pre-tanning and tanning have substantial association with the higher incidence of different skin diseases (Mahamudul et al., 2016).

Even though trainings and awareness programs are vital for workers of any industry, since employees working in tanning processes frequently encounter physical and chemical risks the determination of employee consciousness and the preparation of trainings for it are significant for this sector which is counted in in the category 'Very risky work' (Karakuzu and Elmal, 2019). According to the USEFI, (2004) the major hazards in leather processing industry classified and illustrated as in Table 2.2.

Table 2.2: Major occupational hazard and Their Associated Factors in Tannery Industries

Hazards Type	Reasons
Accident hazards	<ul style="list-style-type: none"> • Slips, trips and falls on the level, especially on wet, slippery • Electric shocks caused by contact with defective and inadequate electric installations • Blows and crushing injuries caused by unguarded rotating or moving parts of machinery • Burns caused by contact with hot surfaces or splashes of hot solutions • Cuts and stabs caused by manual or mechanized working tools • Eye injuries caused by flying particles from rotary buffing machines • Asphyxiation or poisoning in confined spaces, in particular during the cleaning of vats or tanning baths or removal of clogging in drainage pipes
Physical hazards	<ul style="list-style-type: none"> • Exposure to high noise levels from mechanical equipment (particularly drums, reverse settling machines, through-feed staking machines) • Callosities on hands caused by continuous strenuous work with hand tools • Eye strain due to poor illumination levels in the tannery

Chemical hazards	<ul style="list-style-type: none"> • Skin rashes and dermatitis as a result of exposure to cleaners, solvents, disinfectants, pesticides, leather-processing chemicals, etc. • Allergies contact and systematic caused by many of the chemicals used in tanneries
Biological hazards	<ul style="list-style-type: none"> • Raw hides and skins may be contaminated with a variety of bacteria, molds, yeasts, etc., and various diseases (e.g., anthrax, leptospirosis, tetanus, brucellosis, etc.) • may be transmitted to tanners; also, the large quantities of dust produced in buffing operations would normally be contaminated with disease-bearing microorganisms, putrefaction products, etc.
Ergonomic, psychosocial and organizational factors	<ul style="list-style-type: none"> -Acute musculoskeletal injuries caused by physical overexertion and awkward posture while moving heavy or bulky loads, in particular bundles of hides, skins and leather -Lower back pain due to prolonged working in a standing or semi-bending posture -Heating stress, in particular when working on warm days in premises lacking good ventilation or air conditioning

Source: USEFI, (2004)

Unsafe & impairing practices in manufacturing industries are the main causes of injuries & diseases. Alike many other manufacturing industries within the leather processing industry also there are different impairing practices which lead employees to accidents and illness. From the observation made across Indian tanneries the following unsafe practices were witnessed and illustrated in Table 2.3.

Table 2.3: Unsafe Conditions in Tanneries and Their Associated Impairing Practices

Unsafe Condition	Common Observations in Tanneries
Machinery and installation Unprotected moving machine parts Falling, skipped, rolling, slid in thrown parts Hot and cold surface, liquids, steam Electrical current	<ul style="list-style-type: none"> -Missing barrier guards on drums and paddles -Missing passive and active guards on multi-roller machines, presses, splitting machines, slow-comb staking machines, glazing. -Protruding drum door handles -Leaking steam pipes or valve points (from boiler room to work area) -Skin contact with hot plates of vacuum dryer and etc.
Workplace / Station Slippery floors Unprotected floor opening or elevated locations	<ul style="list-style-type: none"> -Wet floors in wet-processing areas, pathways, wet-blue storage and poorly maintained drainage systems -Missing or inadequate railings on mezzanine floors and drum loading platforms -Open wells and pits at floor level -Uncovered drains in work areas

<p>Chemicals and biological agents Hazardous chemicals Gas, vapor, mist, fumes, Aerosol</p>	<ul style="list-style-type: none"> -Lack of information on hazardous chemicals (missing material safety data sheets, labels) -Storage of incompatible chemicals -Skin contact during transfer of chemicals and preparation of recipes -Chemicals spills during manual transport and dosing of chemicals -Inadequate disposal of empty chemical disposal of empty chemical containers and chemical residues (reuse for storage of drinking water and gains, pickles) -Lids of chemical containers in chemical stores kept open Missing or inadequate local exhaust for spraying vapors in workplace (or no use of respirators) -Missing or inadequate local dust extraction systems in dry shaving, dry milling and buffing
<p>Bacteria, fungus, parasites, virus</p>	<ul style="list-style-type: none"> -Generation of hydrogen supplied gas due to intermixing of chemicals or different chemical containing waste streams -Nuisance odor from decomposing solid waste or stagnate waste liquors due to poor housekeeping -Handling of raw material with skin protection (anthrax on raw material) -Accumulating solid waste in work areas attracting rodents, flees and mosquitoes
<p>Fire and explosion</p>	<ul style="list-style-type: none"> -Sparks (at poorly made electrical connections, uncovered grinding of blades cylinders) -Built-up of static electricity (e.g. dry belts rubbing against wooden, plastic parts or rollers) -Spontaneous combustions (oily rags in dry open air) -Chemical reactions (accidental mixing of piled chemicals in stores) -Friction (loose drive belt, poor lubrication) Open flames (cigarettes, matches, candles)
<p>Work environment Temperature and humidity illumination level Noise Vibration Heavy loads Work posture Workspaces Work organization</p>	<ul style="list-style-type: none"> -Radiant heat from coal / wood fire boilers, vacuum dryer and dyeing drums -Climatic conditions due to geographical location Inadequate light intensity and poor location in quality control and finishing areas -Generator sets, compressors located in work areas -Old or poorly maintained tanning machinery -Use of noisy machines such as reverse settling machines, vibration staking machines -Manual transport and carrying of hides in all work areas -Manual lifting of heavy machine parts during maintenance -Poor ergonomic design and adjustments of machines -Extended standing and strained sitting work positions -Unplanned, narrow -Monotonous work, with little scope communication -Social standing of tannery work in society -Extended working hours and lonely night shifts

Source: USEFI, (2004)

2.10. Prevalence of Job-related Injuries and Diseases in Tannery Industries

Many studies indicated that where there are people and complex technologies, there are always safety problem and accidents where these systems are operating (Kassu and Daniel, 2016; Perrow, 1984). A report by, human rights watch (2012) exposed that though tanneries are one of the evolving sectors for trade and finance, they have also adverse effect to the society, environment and worker besides, skin and respiratory diseases are very common health problems among tannery employees due to the hazardous uses of chemical. Tannery employees are at higher risk of experienced work-related injuries and physical disability (Gyan et al., 2020) A study on Hazaribagh area tanneries shown that employees had lost their hand, leg, finger, burned from acid and hot water, electrified as well as physical and chemical hazards, main reason behind this huge number of accident is lack of awareness both in workers and owners and absence of health safety practices with appropriate safety guards in sensitive machineries and poor electric wiring as well (Basak et al., 2019).

Assessment performed on occupational skin diseases prevalence among tannery workers by Seyoum (2014) shown that nearly 34% of leather tanners reported dermatological diseases symptoms such as eczema, rashes, and burning sensation along with complaints of itching. Among them 32.57% were affected on their hands and 21.4% were affected on their face. Analyzing the results of the same study in accordance with leather processing units, it was found that the probability of developing skin diseases were high among workers of beam house i.e. 88.5% lower among Crust room workers and 87.2% lower among finishing room workers compared to beam house workers. A study performed on leather tanneries near Chromepet, India also exposed that workers who were exposed to chemicals used in dyeing and tanning of leather goods have developed a various skin infection (33%), acute bronchitis, acute gastritis, urinary tract infections. It was also exposed that employees with longer exposure tend to develop multiple system involvements.

A study conducted on 20 tanneries across Bangladesh tanneries revealed that among 316 tannery employees around 63.3% of workforces were affected with at least one health problems. Majority of the employees were suffering from skin problem (25.3%), gastrointestinal problem (8.5%), chronic headache (8.2%), allergies (5.7%), respiratory system problem (6.3%), cardiovascular problem (6.3%) and (3.5%) eye problem (Islam et al., 2017).

Another study conducted on 35 tannery industries of Bangladesh around Hazaribagh area, discovered that about 35% of the tannery workers are suffering from gastrointestinal disease, 25% from dermatological disease, 10% from Headache, Hypertension and Lethargy (Mohanta et al., 2012). Tannery workers are potentially exposed to harmful agents rendering them vulnerable to health problems especially those of respiratory tract and skin. According to the study conducted on tannery workers in Karachi, Pakistan prevalence of asthma in leather tannery workers appears to be high and is associated with educational status, ethnicity, smoking, glove usage, perceived to have allergy and duration of work (Khurram, 2006).

A cross sectional study performed among tannery workers Bangladesh, Dhaka Mahamudul et al., (2016) revealed that the prevalence of work related illness was found to be 71.7% gastrointestinal problem, 71.7% Diarrhea, 52.2%, Blood pressure, 49.9% Asthma, 46.7% Eye problem and skin diseases such as nail discoloration constitute 69.6%. The findings of the above research indicate the gravity of prevalence of occupational injuries and illness within the tanning industry thereby its effect on employee's safety and wellbeing.

To summarize various studies on tanneries around the world showed that tannery employees were vulnerable to many industrial illness, including respiratory problems, gastrointestinal disease, skin diseases, hypertension, asthma, acute bronchitis, acute gastritis diarrhea, eye problem etc. (Panjakumar et al., 2020; Atiqur, 2014; Padma et al., 2016; Mahamudul et al., 2016).

2.11. Costs of OSH and Their Economic Impact

The investments in OSH have both social and economic paybacks for the companies and recent researches such as Boileau (2016) have also confirmed the benefits of OSH in firm's competitiveness & productivity.

There are direct and indirect costs associated with job-related accidents. Direct costs are expenses related to hospitalization and compensations to the employee for any disability in regards to the accident. The indirect costs include overtime payments necessary to make up for lost production, cost of recalling an additional employee, a wage cost for the time spent by HRM personnel recruiting, and selecting. In addition training cost, lost hours, equipment impairment, decline in production and others are hidden costs to the firm (Robert and John, 2004).

According to Bayram et al., (2017), the relationship between OSH prevention costs, performance, and employee satisfaction found that both job-related safety performance and employee satisfaction are positively related to a decrease in the costs of workplace accidents. Besides, A properly implemented and efficiently operated OSH practice can bring tangible cash benefits and considerable savings due to reduced cost of accidents, lower sickness absence and a reduced number of product complaints (Jan, 2012). The difficulty of establishing linear comparison between loss and benefit due to an accident in a tannery with respect to production of a factory is stressed out on the study of Basak.et al., (2019) in tanneries of Bangladeshi. However, empirically it can be equated between expenses for health and safety measures and gross production cost and sale of a factory.

The discoveries of the studies ascertain the cost to promote good working environment and OSH status has an effect on production cost but good workplace; skilled, safe and healthy workers are profitable in the long run.

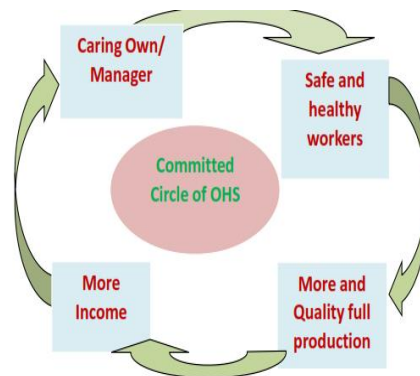


Figure 2.1: Economic benefits of OSH establishment in factories

Source: (Basak. et al., 2019)

2.12. OSH Performance Measurements

According to the definition made by Office of the Australian Safety and Compensation Council, ASCC (2005) OSH performance can be described as a measure of the level of effectiveness of those business activities aimed at the prevention of injury and disease to persons in the workplace (Metin & Mustafa, 2018). Mainly, occupational health and safety (OHAS) is largely measured by negative outcomes such as workplace injury and illness but these measures have a

gap, for instance, a low incidence of injury does not necessarily mean that adequate safety systems and controls are in position (Basak. et al., 2019).

As stated on the study conducted by Metin & Mustafa (2018), two major parameters are used together in the measurement of the OHS performance of an organization: proactive and reactive. Proactive (Leading) indicators are used to measure the actions taken to reach targets, while reactive (Lagging) indicators focus on whether the organization achieves its targets (ASCC, 2005). The lagging indicators refer to the measurement tools that use data resulted from work-related accidents, injuries or losses occurred in the place of work (Abbas and Saad, 2013). The incidence rate, the incident frequency rate or the severity rate are illustrations of this category of indicators. Whereas the leading indicators depend on pre-accident data such as inspection data, surveys, audits, sampling workers' behavior or corrective action achieved (Kassu 2017; Abbas and Saad, 2013). Other than the lagging and leading indicators performance measurement includes use of benchmarking, measurement of performance improvement over reference line, objective setting, safety management valuation tools, employee opinion inspections, use of technology to capture and analyze safety data (Hale et al., 2010).

At last, as any organizational system OSH practice need also continuous performance measurement through the adoption of tailor made both lagging and leading indicators and hence to take the necessary measures of improvement.

2.13. Impact of Occupational Safety & Health on Employee Productivity

Productivity is a multi-dimensional thought whose definition varies based on the purpose for which the definition is set. Labor productivity is defined as the quantity of production output per unit of labor, which can be represented by the number of hours worked, the number of employees or the number of workers and other unemployed staff (Stocker, 2015).

Most literatures in OSH believe that people do well when they are physically and emotionally able to work and want to work, which in turn leads to higher productivity, which can lead to higher profits. In addition those literatures also rely on the close linkage between OSH and productivity. The health and safety of all workers is closely linked to the company's productivity in all workplaces (Oxenburgh. et al., 2004; Abera & Yeshmebet, 2020). Healthy people are expected to contribute more to productivity and innovation. Occupational accidents and

absenteeism from place of work causes productivity loss Michaels (1985) besides, the primary beneficial impact of occupational safety and health on productivity is reduced absenteeism (Esther, 2017).

As indicated on the study by Katsuro (2010) a central faith in most of the occupational health promotion literature is that people perform better when they are physically and emotionally able to work and want to work which in turn brings higher productivity. Other studies also indicated that there is a direct relation between the two.

Considerable links between the implementation of health and safety programs and their beneficial influence on a company's productivity and profits are emerging both directly (such as reduced sick pay and compensation claims) and indirectly (for example, reduced absenteeism, better company reputation and reduced staff agitation (Webb, 1989). Findings of a study conducted on manufacturing sector in Kenya Esther (2017) revealed that Employee wellness constituted the first important factor that affected Employee Productivity. The same study and many OSH reports also argue that there is clearly a vicious circle in that healthy and happy workers are more productive, leading to increased investment in safety and health to reduce accidents, which in turn lead to further productivity gains.

Many research findings indicated that employees' productivity is influenced by management safety practices and safety programs, management attitude towards health and safety, investigation of accidents, supervisors' safety, and training of staffs towards OSH on safety. In addition health and safety, if managed effectively have a positive impact on productivity (Yankson, 2012; Agwamba, 2018).

Improving employee productivity and occupational health and safety have been an essential field of interest of industry especially in unindustrialized nations. Industries of developing states are mostly characterized of inappropriate workplace design, ill-structured jobs, mismatch between job demands and worker's abilities, adverse environments, poor human-machine interface, and inappropriate management programs (Ramazan.et al., 2016). These factors lead to workplace hazards, poor employee health, mechanical hardware injuries, and disabilities, which diminish the employee productivity and work/product quality and increase the cost (Shikdar & Sawaqed, 2003). In addition firms Economic loss due to OSH lead to decreased

productivity. According to WHO (2009), that injury related unplanned workers absence, incapacity and pre mature death leads to economic losses that can reduce the productivity and efficiency of a company, which may negatively affect its incomes and profits, its ability to invest profits into new capital buildup and thereby reduce the wealth or consumption possibilities.

Many literatures suggest different ways of majoring employee productivity. However it is generally accepted that the number of hours worked is the most appropriate measure of input because a simple headcount of employed persons can hide changes in average hours worked, caused by the evolution of part-time work or the effect of variations in overtime, absence from work or shifts in normal hours (Babaeinesami, 2016).

2.14. OSH Practice and Improvement Approaches

2.14.1. OSH Practice

Many scholars define Occupational safety and health practices in different ways, but the fundamental concept is the same. According Reynolds (2011), Moreover, the researchers also argued that OSH system should not be treated as a distinct process, but as one that is integral to the way in which activities take place in the company. According to occupational safety and health administration OSHA (2016), management leadership, workers participation, hazard identification and assessment, hazard prevention and control, education and training, program evaluation and improvement, and communication and coordination for host employers and staffing agencies are recommended fundamental elements for OSH practice. Correspondingly, basic components of OSH practices are comprised of management commitment, employee training and participation, safety rules and procedures and OSH policy (Vinodkumar, 2010).

Employee Training & Participation• In line with the findings of the study conducted on OSH aspect of manufacturing industries Muthukumar (2019), the most critical of OSH Practices is the health and safety programs which involve training the employees and organizing them to prevent the injury and catastrophe in the work environment keeping their attitude towards Safe Production. The importance of safety training for the success of OSH practices within organizations has given emphasis by many scholars. As stated by Gardner et al. (1999), the promotion of OSH cannot be achieved without the employees“ full co-operation and

commitment. According to Othman (2012), effective training programs can decrease the number of accidents, injuries, legal liability, employee compensation, and equipment damage and employees absence from workplace. The same study also highlighted that companies must arrange a general safety program to teach their employees the knowledge of safety & health and how to handle the risks.

Besides provision of trainings in relation to OSH should not be limited to employees only but also include members of top management. Since upper level management can set priorities and have a greater impact on organizational strategy, there is a need for more research on these individuals (Huang et al., 2011; Kassu & Daniel, 2016).

Absence of knowledge, attitude and behavior on the part of employees, employer and regulating bodies in developing countries, at the consequence occupational diseases and injuries are very common due to lack of adopting simple preventive measures (Ahmad, 2016).

Collaboration between management and workers within an organization is a crucial element of prevention of accidents and diseases at place of work.

Literatures also support the formation of safety committee within organization in order to foster the involvement of all workers. Establishing safety committee in the work place including employees and management team creates worker involvement and sense of accountability. Both employees & employers have their own role for the success of OSH with in an enterprise.

As stated by Alli (2008) participation is a fundamental employees' right, and it is also a duty. Besides, companies have various obligations with regard to providing a safe and healthy workplace, and workers should, in the course of performing their work, cooperate in order to enable their employer to achieve those commitments.

Management Commitment : All levels in the management should commit and demonstrate their support of the safety and health program to make the safety management effective (Shekh, 2015). The impact of leadership on OSH implementation and success is critical. Besides, in many firm's management is responsible for most of safety issues in the company because they has control over the available resources (Othman, 2012).

The commitment of the management can be manifested in several ways. According to (Alli, 2008), management commitment to OSH may be demonstrated in various ways, such as: Allocating sufficient human and financial resources for the proper functioning of the OSH

program; establishing organizational structures to support managers and employees in their OSH duties; designating a senior management representative to be responsible for overseeing the proper functioning of OSH management.

Safety rules and procedures▪ Work place safety rules and procedures are essential elements of organizations OSH practices which enable workers to comply with the safety regulations and thereby maintain staffs wellbeing. Safety compliance is employee’s level of adherence to safety procedures and their ability to do their job in a safe manner (Chandrakantan, 2016). Safety rules comprise of regular safety inspection, supervisor imposing safety rules and effective safety and health rules, procedures in workstation to prevent accident, which help in altering workers’ safety behaviors (Said, 2015).

OSH Policy▪ Developing a clear written OSH policy and plan is the first step in the process of developing efficient OSH management practice. National OSH policy encourages companies to develop their own organizational OSH policy. It is hard to monitor organizations on the issue of OSH policy, in the absence of countrywide OSH policy. The company OSH policy has different parts and may differ according to the nature & context of the sector and the organization; however there are critical components that any OSH policy should incorporate.

The health and safety policy statement does not need to incorporate the complete details of all procedures, but it has to encompass the provisions and procedures for how all OSH matters are managed (HSE, 2004). Consistent with Armstrong (2009), policy statement should consist of three parts: the general policy statement, the description of the organization for health and safety and details of arrangements for implementing the policy. Besides, written safety and health policies prove how the top management is concerned about the protection of the organization’s employees from work place injuries & hazards.

2.14.2. OSH Improvement Approaches

In practical terms there is no “one-size-fits-all” OSH improvement scheme and every organization should adapt its own approach tailored to its existing practices, challenges and limitations. A major factor of company safety performance is its safety management system and one advocated continual improvement model is the PDCA approach, which comprises of the plan-do-check-act cycle (Marcia, 2016; HSE, 2013). Consequently, the key components of OSH

improvement approach through Management system are, policy and leadership development; planning and change management; organization development; implementation; checking and taking corrective action; and management and performance review (Jilcha, 2020). There are different improvement approaches towards OSH practice within organizations among them the three “E” symbolic approach is the one. According to Charles (2003), the first is about engineering, design and layout of the work process. The second one is education, which contains training and taking workers focused. The last one is enforcement, which deals with implementation of policies and procedures of OSH. Another improvement approach is total safety management which involves the relation between the different determinants of management and the consequences in safety and health of organizations. The model considered empowerment, management commitment, training and communication, and risk management as contributing success factors for OSH practices. Besides it used as a model of self-evaluation tool by considering results of improvement from the point of view of the company, employees and society (Susana et al, 2014). A study on integrated system model development for OSH practices of manufacturing Industries identified six major improvement factors as knowledge diffusion, OSH management, collaboration, suitable technology application, workplace innovation, and lean workstation. They are sated in the order of their priority and integrated to create a unique model for the OSH improvement (Jilcha, 2020). Another study focused on site specific OSH program for manufacturing firms identified four major elements for OSH improvement. *Top management commitment to OSH*, which desires incorporation with core business function, top management engagement and decision making; *employee participation in OSH management structures*, such as OSH committees, hazard analysis procedures, and accident investigation strategies; *improvement in human and material resources for hazard analysis, control, and prevention*; *ongoing education and training*, both for permanent and contract employees (LaMontagne, et al 2004). The study made on Bangladesh tanneries forwarded the following points for improving health and safety condition such as awareness build up program, supervisors workshop, PPE delivery with hands-on demonstration, updated technology for machineries maintenance, user manuals development, electrical guard set up, machineries guard installation, demonstrations of proper way for chemical storage and distribution, adoption of safety sign and first aid box, etc. (Basak.et al., 2019).

As any other system the improvement approaches for OSH practices rely on the context, industry nature, safety climate, existing challenges and practices. Hence, every industry needs to develop its own improvement method consistent with the above conditions via customizing to its existing practices.

2.15. OSH Affecting Factors

As any organizational system the success or failure of OSH management system will also be affected by some elements. Implementing the OSH system without identifying and analyzing those factors will result in unnecessary loss in time and cost. Hence, prior to implementation identification of the elements influencing the successful realization of the OSH within organizations are highly important to improve these managements systems, increasing health and safety of employees and work safety and finally to improve the success rate of the institutions. Successful implementation of Occupational safety and Health Systems ensures the safety of employees and protects their health and thus has an important role in increasing their productivity and efficiency.

The success factors are varying and yet not stable for different industrial sectors as there is vibrant environment of workplace variation (Wagenaar and Groeneweg, 1987). OSH Success or failure normally comes from good or bad leadership, worker involvement and communications HSE (2015). Researches on different sectors pointed out factors that contribute for the success of OSH within companies.

For the successful implementation of OSH within an organization both employers and employees have responsibility and one is complementary for the other. According to GoA (2008), employees are expected to perform in a safe manner, be safety conscious on their occupations and collaborate with their employers in the health and safety measures they put in place as well as not behave in a way that puts others at risk. The study also emphasized that companies have also the obligation to ensure that all their staffs are protected from health and safety risks arising out of their work activities. Professional independence of OSH practitioners, senior management commitment and awareness regarding OSH implementations, resource allocated by senior management to OSH implementations and the continuity of the OHSMS audits play vital role for the success of OSH practices within companies (Harun and Ender, 2018). The recommendations

forwarded based on the study by Nathai and Koonj (2012) pointed out that factors for OSH success include developing an OSH policy, providing OSH training, setting OSH rules and regulations, performing inspections for hazardous conditions, performing job hazard analysis, conducting investigations of accidents, establishing programs promoting OSH, establishing platforms to protect employee health and well-being, managing subcontractors, and establishing program to plan for emergencies. Besides failing to perform the above success factors, effective implementation of an OSH system is appealed to come across many difficulties and barriers. The findings of the study by Gallagher et al, (2003) revealed the following OSH barriers first; companies may fail to do with management support and staff discussion. Second, they may adopt 'audit' systems in such a way that they are intrinsically unlikely to improve OSH results. Third, systems may be applied in a failure-prone setting.

At last, there might be similarities among common success factors for OSH among industries. However, it should be noted down that success factors may also differ according to nature of the industry, safety culture, time, and region which are inherent to the sector. Hence companies should identify and give concern for their organization's OSH success and failure factors by continuously reviewing the process.

2.16. Global and Ethiopian Research works on OSH in Tannery Industries

For this study, the researcher had reviewed several literatures from contents of articles and researches published on international journals discussing about OSH practice and challenges of the tanning industry were identified and analyzed. The literature sample comprises of scientific articles and researches that were published in the international journals both in the global & local context. The review particularly focused on common OSH accidents and diseases, magnitude and prevalence of injuries & diseases as well as their associated factors of the leather processing industry. In addition scientific studies dealing with OSH management, performance measures, impact on productivity as well as OSH costs and impact on the economy were also reviewed.

In Ethiopia, OSH provision has very low coverage with respect to injury recording system, basic services, research on OSH subjects and accident prevention strategy Kassu, (2017). Despite this fact the figures of those few sources indicated that accidents occurring in work places are

aggravating from year to year and total economic losses, social and human crises resulting due to these accidents are huge MOLSA (2016). While some studies have been conducted in relation to OSH within the manufacturing sector, only few researches have been made in tanneries case. Since the ramifications of OSH are dependent on the type of work environment, it is vital to study the practices in sector specific manner. Besides those few past studies were not holistic means consider only one or two aspects of OSH in tanneries, such as major causes of OSH, exposure, effect of OSH on employee's morale, motivation and job satisfaction etc. in a separate manner. For instance, in relation to effect of OSH on employee job satisfaction, a study entitled, Employee Welfare Measures in Leather Products Manufacturing Enterprises and Its Implications for Employee's Job Satisfaction Worku (2017) was conducted in Addis Ababa. The findings of this study revealed that, slighter attention was given to employee welfare measures by leather products manufacturing enterprises and welfare measures have significant positive relationship with employee's job satisfaction. A study conducted in Dire tannery, which is located in Addis Ababa also revealed that among the total employees of the tannery 45%o of the workers are exposed to body injury (Yewaydemam,2012). A more comprehensive study was conducted by Teklit (2016) on occupational risks and hazards exposure, knowledge of occupational health and safety practice and safety measures among workers of Sheba leather Plc. Wukro, Tigray Ethiopia. The results of the study uncovered that, more than a quarter of the workers were exposed to high occupational risks and hazards exposure. Majority of the workers have good knowledge of OSH practice with good adoption of safety precautionary measures and use of personal protective equipment's.

Another limitation of those past studies is that, since most of the studies are from the discipline of health science their focus of area was mainly on health aspect of employees working in tanneries by neglecting the safety aspect. An institutional based cross sectional study entitled, assessment of tannery occupational skin diseases and associated factors among tannery workers on selected tanneries of Addis Ababa, was conducted by (Dejene, 2014). This study stressed out that workers working in Beam house, Re-tanning & Dying sections are affected more than other units of the tannery by dermatological diseases. Another comparative cross-sectional study on occupational risk factors associated with respiratory symptoms among tannery workers in Mojo town was also conducted by (Innawu .et al., 2019). According to the findings of this study the

prevalence of respiratory symptoms was higher among tannery exposed workers compared to unexposed ones. The study also showed that Sex, employment status, ventilation of working units, absence of OSH training, and not using personal protective equipment were the major factors associated with occupational-related respiratory symptoms. The complete summary of literature review conducted on OSH practices of tanning industries in Ethiopian and global context were gathered and presented in Table 2.4 and (Appendix A) respectively.

Table 2.4: OSH studies in Ethiopia tannery industries, evaluation of works & identified gaps

The research area	Authors and Year	Objectives	Methodologies	Findings	Identified Gaps
Assessment Of Occupational Skin Diseases And Associated Factors among Tannery Workers, Of Selected Tanneries, Addis Ababa Ethiopia,	Dejene Seyoum, 2014	To assess Prevalence of occupational skin diseases and its associated factor among tannery workers of selected tanneries of Addis Ababa.	institutional based cross sectional Study, structured questionnaire, and observational check lists was done	Workers Working in Beam house, Re-tanning & Dying section are affected more than other units of the tannery by dermatological diseases	The study deals with only health aspect specifically skin diseases, by neglecting the safety side & associated factors
Socio-economic Impacts of Bahir Dar Tannery; Bahir Dar, Ethiopia	Fitsum Dechasa & Fikirte Demissie, 2014	To assess its socio-economic impacts and examine the level at which the tannery implemented EIA recommended mitigation measures	Different groups were consulted (household heads who reside near the tannery; Workers and technical manager; and officers of Environmental Protection Agency)	The workers are facing different potential health hazards, due to lack of safety/protective devices, while working in the tannery. The residents near the tannery are also suffering from different health hazards due to the untreated waste water disposed from the tannery.	The study deals with the health hazards faced by tannery workers & its environmental effects. Safety aspect and Other OSH parameters such as performance & productivity were overlooked

Occupational risks and hazards exposure, knowledge of occupational health and safety practice and safety measures among workers of Sheba leather plc., Wukro, Tigray Ethiopia	Teklit Gebregiorgis Amabye, 2016	To investigate exposure to occupational risks and hazards, knowledge of occupational health and safety practices, safety precautionary measures and use of protective equipment's among employees.	A cross-sectional based study close-ended structured questionnaire was used	More than a quarter of the workers were exposed to high occupational risks and hazards exposure. Majority of the workers have good knowledge of OSH practice with good adoption of safety precautionary measures and use of personal protective equipment's	The study only considered the safety side neglecting the health side. Major causes of injuries were also not investigated Besides, effect on performance & productivity of employees was missed. Finally improvement strategy was overlooked.
Occupational risk factors associated with respiratory symptoms among tannery workers in Mojo town, Southeast Ethiopia.	(Innawu, et al., 2019)	To investigate the magnitude and risk factors associated with work-related respiratory symptoms among tannery industry workers in Mojo town, Ethiopia.	A comparative cross-sectional study with stratified sampling method, questionnaire and interview was conducted.	The prevalence of respiratory symptoms was higher among exposed workers compared to unexposed ones. Sex, employment status, ventilation of working units, absence of OSH training, and not using personal protective equipment were the factors associated with occupational-related respiratory symptoms.	The major limitation of the study is it only considered the health part, In particular the respiratory symptoms on workers discounting the safety problems.
The effect of OSH Program on Organizational Productivity: In case of Bahirdar Tannery	Abera Ayalew & Yeshmebet Demissie, 2020	To evaluate the effect of occupational health and safety program on organizational productivity in Bahir Dar tannery	Descriptive and explanatory types of research designs stratified sampling method. Questionnaire was conducted.	Except biological hazard control program chemical, psychological and accidental hazard control programs have positive and significant effect on organizational productivity. Besides, organizational productivity was mostly affected by chemical hazard control program.	The study only measured the effect of OSH program on organizational productivity and didn't consider its effect on other organizational performance. Moreover, didn't assess other aspects of OSH such as major work-related injuries, illness and their associated factors

2.17. Summary and Identified Gaps

The above sub chapters of the literature review provide an insight to readers about the theoretical view of the topics under study and contain conceptual structure of the research concerning the frameworks by which the overall research tasks guided. In line with the basic research questions and objectives of the study, this literature review chapter covers topics related to the theories and concepts of OSH impairing practices and challenges within the manufacturing sector and in particular the tanning industry. In addition, the present chapter includes research findings about major causes of occupational accidents and diseases in the leather industry as well as their effects on productivity. Issues like global and national trend of occupational accidents, deaths and diseases; management commitment & importance of employee's awareness programs also reviewed.

As discussed in the last part of this literature review the major gaps drawn from past researches can be summarized into three major parts.

The first limitation observed was only few researches have been made in relation to OSH aspects of tanneries in Ethiopian case. Besides those few studies were not all-inclusive, reflect only one or two aspects of OSH in tanneries, such as major causes of occupational injuries, exposure, effect of OSH on employee's, motivation, and job satisfaction as well as social & environmental impact in a separate manner (Teklit, 2016; Hunegnaw, 2015; Fitsum & Fikirte, 2014; Dejene, 2014; Innawu, et, al., 2019; Worku, 2017; Abera & Yeshmebet, 2020). However, in order to solve the ramifications and get an integrated solution with regard to OSH practices, dealing and analyzing the practices, challenges, associated factors & their impact in a holistic manner is crucial.

The second overlooked area has been found that most of the articles, including global ones focus only on the health aspect of the tanneries by neglecting the safety issue Dejene (2014); Innawu, et, al. (2019); Padma, et, al. (2016); Subodh, et, al. (2008); Iti and Meenu (2019); Madiha, et al. (2010); Gaafar, et al. (2010); Mohanta *et al*, (2012); Salauddin & Tawhidur, (2012); Mahamudul et al. (2016) and Islam et al., (2017), which lacks addressing the complete picture of the subject under study.

Thirdly, consideration of performance and productivity aspects of tannery workers in line with the OSH practices, challenges, improvement as well as in depth analysis to engineering and technology (machinery & equipment) aspects were also neglected (Kashyap, 2021; Fadewa,

2017; Subodh, et, al, 2008; Padma et al., 2016; Atiqur, 2014; Shilpy et al.,2019; Ismail and Abu,2019; Worku, 2017; Mohanta et al, 2012; Mahamudul et al., 2016). As a final point, almost all of the studies have not gone through an integrated improvement strategy that should be developed after analyzing the impairing practices, associated factors and their magnitude of impact. Researchers of the area also suggest the importance of further research and set future research directions. Finally, to analyze the impairing practices, challenges and associated factors as well as effects on labor productivity it needs an in depth and comprehensive study.

Therefore, this research paper tries to address & fill those gaps on occupational safety & health practices in tanneries in a holistic approach by conducting thorough investigation on the major work-related injuries, illness, impairing practices, and challenges, root causes for accidents and diseases, influence on labor productivity, employee's awareness and involvement as well as management commitment. Significant of association between the demographic, behavioral and environmental factors with accidents and illness exposure as well as their magnitude of effect also explored. Moreover, in depth analysis of leather processing machineries safety condition and causes of riskiness in relation to OSH was conducted. Finally, an improvement strategy has been forwarded based on the findings of the study for the case tanneries in particular & the tanning industry in general.

CHAPTER THREE

3. RESEARCH METHODOLOGY AND DESIGN

3.1. Introduction

In this chapter; the procedures, tools and materials used for collecting, analyzing and methods of presenting the analyzed data are discussed in detail. The chapter includes the sub sections dealing with background of study area, research design, sources of data, population and sample size determination procedures and variables of the study required to investigate occupational safety and health practices and challenges of the tanning industry via considering the conditions within the case tanneries. The main purpose of this chapter is to indicate how the research was directed throughout the thesis periods. The last part illustrates the general research framework.

3.2. Background of Study Area

The history of modern leather industry in Ethiopia dates back to the middle of 1920s. Currently, the country has about 31 tanneries with a total installed capacity of 187.19 million square feet of leather from skins, and 58.68 million square feet from cattle hides. The actual production capacity utilized is 44.79% for skins, and 63.78 % for cattle hides. Ethiopian tannery clusters found to be 17(54.84%) in Oromia, 9(29.03%) in Addis Ababa, 4 (12.90%) in Amara and 1(3.23%) in Tigray regional states (LIDI, 2020).

The study entitled “Occupational Safety and Health Practices, Challenges and Improvement Strategy in Tannery Industries: - A case of ELICO” was conducted in Awash & Abyssinia tanneries of Ethio-Leather Industry PLC (ELICO). Both Awash & Abyssinia tanneries are located within Addis Ababa which is capital city of Ethiopia. Awash tannery was established in 1949 E.C & Abyssinia tannery was established in 1957 E.C. Ethio-Leather Industry PLC.(ELICO) was established in August 1997 as the leather wing of MIDROC Ethiopia to manage and operate the two tanneries and a leather garment and leather goods manufacturing factory that were acquired from the Ethiopian Privatization Agency. Awash tannery was landed in Addis Ababa with a total area of 75,000m² & Abyssinia tannery also landed in Addis Ababa with a total area of 20,143 m². Both the tanneries have installed secondary effluent treatment plant (ETP) within their premises. The following major factors were considered in selecting the

case company: - population (Number of employees within the tanneries), gender composition, year of establishment, availability of sister tanneries within one organization, data accessibility & convenience. Moreover, the implications during preliminary assessment period (availability of highly obsolete machineries, risky and hazardous work place environment) also other major factors for conducting the research within the case company.

3.3. Research design

The research design for this study has been fixated to descriptive research method to describe the theoretical and practical aspects of Occupational Safety & Health as well as to investigate the impairing practices & existing challenges with particular references to the conditions prevailing in the case company tanneries. Descriptive survey is a consistent data collection method in which both qualitative and quantitative methods can be used. Descriptive research includes surveys and fact-finding enquiries of different kinds and the major purpose of descriptive research is description of the state of affairs as it exists at present, (Kothari, 2004). The qualitative part was conducted through structured interviews held with key informants and management members of the case company. Besides in-depth direct observation, OSH related manuals and procedures were also reviewed. The quantitative approach was conducted through well-structured questionnaires distributed target respondents based on the sample size of the study. target population of the study comprised of supervisory and non- supervisory employees of the selected tanneries. The collected data was analyzed and presented through both inferential and descriptive statistics tools including SPSS and Excel and presented via tables, charts and graphs.

3.4. Population, Sample Size and Sampling Technique

Population refers to the complete set of individuals having common characteristics in which the researcher is interested. In selecting the research subjects, both purposive and stratified random sampling methods has been employed. First purposive sampling is used to purposefully select the case company (ELICO) i.e. Awash & Abyssinia tanneries as well as the target population. Next, stratified random sampling is applied to determine the desired sample size. Consequently, from the data taken during the study period it was observed that there were a total of 602 workers who have been working in the case company tanneries which are source of population.

The target population of the study constitutes Production (beam house, tanning, post tanning and finishing), Effluent Treatment Plant (ETP), Maintenance, Laboratory and testing, research and development as well as raw hide and chemical store of the case tanneries. According to the data taken during the research period there were a total of 503 employees within this population.

As indicated above the total number of the target population is 503. In order to decide the required sample size, the researcher employed Taro Yamane (1967) sample selection method with 5% acceptable level of error. According to this method, a total of 223 sample which is 44.33% drawn from the target population.

$$\text{Sample size (n)} = N / (1 + N (e^2)) = 503 / (1 + 503 * (0.05)^2) = 223$$

Where:

n = Sample Size of the case tanneries from all strata;

N = Total Population Size;

e = Acceptable Level of Error (that is 5 percent=0.05)

Source: Yamane (1967)

Hence, based on the above calculation the researcher distributed 223 questionnaires in line with the required sample size of the study.

The number of questionnaires distributed to each tannery has been determined by using simple random sampling technique. $n_j = n * N_j / N$

Where,

n=Total sample size

N=Total target population

N_j =Target population for tannery j

Table 3.1: Tabular presentation of sampling procedures

	Awash tannery	Abyssinia tannery	Total
Target population size(N)	380	123	503
Sample size ($n_j = n * N_j / N$)	$n_j = 168$	$n_j = 55$	223=study sample size

Again, the number of questionnaires disseminated to each department of the target population is also determined via simple random sampling technique in proportion to the number of employees at each work divisions (Table 3.2).

$$\text{Allocations} = \frac{\text{No. of employees in each work unit} \times \text{sample size}}{\text{Total number of population}}$$

Table 3.2: Questionnaire distribution in each department

No.	Work unit	Total No. of target population			Sample size		
		Awash	Abyssinia	Total	Awash	Abyssinia	Total
1.	Production						
1.1.	Beam house	91	22	113	40	10	50
1.2.	Tanning	35	15	50	16	6	22
1.3.	Post tanning	86	20	106	38	9	47
1.4.	Finishing & Packing	95	36	131	42	16	58
Subtotal (Production)		307	93	400	136	41	177
2.	Maintenance	36	11	47	16	5	21
3.	Rawhide & chemical store	15	8	23	6	4	10
4.	Quality laboratory, Research & Development & ETP	22	11	33	10	5	15
Total		380	123	503	168	55	223

3.5. Data sources

Along with direct observation that was held on the case tanneries floor and compound, primary data of this study were gathered through well-constructed questionnaires which constitute both open and close ended questions. In addition, structured interview that was held with management team including tannery and production managers as well as selected key informants was also served as primary source of data. As for the secondary data, besides the review of the related literature, the case company webpage, tannery documents, other tannery occupational safety & health manuals in relation to the subject matter under study has been reviewed. Relevant organizations, ILO, MOLSA, LIDI and WHO reports also served as source of secondary data.

3.6. Data Collection Methods and Instruments

The data to be used for the study was collected through both primary and secondary data collection methods. Primary data was collected through the use of well-designed questionnaires, structured interview & direct observation via predesigned checklist. A total of 223 questionnaires were distributed based on the predetermined sample size. The questionnaires were prepared both in Amharic and English, so according to the interest of the study participants both versions of questionnaires were distributed. Besides to the direct observation that was made on the floor of the case company tanneries & questionnaires filled, primary data was also collected through the use of two sets of structured interview. The first one was held with factory managers, production managers and selected department/section heads of the case tanneries. Another set of structured interview was also developed & conducted with the health and safety officer, medical doctor and health officer of the case tanneries. A checklist was also employed to facilitate the direct observation made on the tanneries floor to collect data with regard to factory layout, raw material, finished goods and work process inventory, machineries & equipment status, electrical installations as well as other aspects of the tannery in line with OSH practice. In addition to review of the related literature, secondary data was collected through referring case company tannery documents; other tannery occupational safety & health materials in relation to the subject matter of the study.

3.7. Validity and Reliability of the Research

Conceptually, validity seeks to answer the question: whether the instrument adopted measures what it is supposed to measure, (Marczyk et.al, 2005). Therefore, to maintain the internal validity the researcher has developed well-structured questionnaires, to collect valid data from the respondents. The researcher was developed the questionnaire, distributed to co-advisor & advisor, LIDI experts on the field of study, selected sample research participants for pre-test and other colleagues for feedback, and incorporate the feedbacks to make sure the data collection instrument can collect all the necessary and relevant data.

External validity of research findings is their generalizability to populations, settings and measurement variables. Hence, the researcher was selected representative sample to collect relevant data that can be inferred to the whole population and maintain the content validity. The researcher also adopt the instruments from different interrelated literatures thus for the tools to

truly measure what they intended to measure. Besides, earlier developing the questionnaires the researcher has linked the contents to the research questions & objectives of the study.

Reliability has various definitions and approaches, it refers to the degree of consistency with which a data tool measures and hence certifies stable measurement across time and across the different stuffs in the instrument (Sekaran, & Bougie, 2010; Kassu, 2017). To ensure consistency among responses and to minimize bias during data collection the researcher himself explained the objective of the study for respective officials & administered the data collection tools, besides questionnaires were disseminated to the study participants following a logical pattern.

In addition for those questions that has likert-Scale measurement reliability test was computed by using Cronbach's Alpha tool developed by Lee Cronbach which used to determine level of internal consistency among a set of items are as a cluster (Cronbach, 1951). Accordingly, reliability coefficient of 0.70 or greater are considered adequate for a measurement that to be used to examine associations.

Table 3.3: Questionnaire Items Reliability Test

S/n	Variable	Number of items	Cronbach's α coefficient
1.	Tanneries work place status	9	0.705
2.	Occupational injuries exposure rate	13	0.886
3.	Work-related illness prevalence rate	20	0.927
4.	Overall	42	0.939

(Source: Own survey, August-Sep., 2020)

As illustrated on Table 3.3 the scales used in this study met the recommended standard of $\alpha \geq 0.70$, which specifies a very strong internal consistency among the measurement items.

3.8. Dissemination of Research Finding

The outcome of this study shall be communicated to relevant interested parties' among them Addis Ababa University is the major one. Hence the result of the research will be submitted and presented to Addis Ababa Institute of Technology, School of Mechanical and Industrial Engineering.

Moreover, the result of the research will be communicated to the case company tanneries, Ethiopian Leather Industry Development Institute (LIDI) research council and United Nations

Industry Development Organization (UNIDO). An attempt will also be made to present the findings of the study on the local or international journals.

3.9. Ethical Consideration

Research ethics helps to protect the rights of the research participants. With respect to this study, during data collection permission was obtained from every study subject after clearly explaining the purpose of the study to the management and concerned officials of Ethio-Leather Industry PLC (ELICO) & the case tanneries with in it. All information that was collected from the respondents was treated with confidentiality without disclosure of the respondent's identity. Furthermore, in this research no information was modified or changed, hence the gathered information was presented as collected and all the literatures collected for the purpose of this study were duly acknowledged in the reference list. The rights of secrecy and informed consent have been considered by the researcher.

3.10. Research Variables

Dealing with the basic research subjects of this research, the basic variables of the study comprises of both dependent & independent variables.

Independent Variable

The independent variables of the study are categorized in to three:-

Socio demographic factors: comprises of age, sex, mode of employment, educational level, work experience and salary.

Work environment factors: comprises of place of work supervision, units of work (job category), health and safety related training, working & rest hrs., safety conditions of machineries & equipment's, level of management commitment as well as tanneries work place conditions.

Behavioral factors: comprises of job satisfaction, awareness and adherence to safety procedures, status of using personal protective equipment (PPE) as well as behavioral aspects such as alcohol taking status, chat chewing status, smoking status

Dependent Variable

In this study, factors such as occupational accidents, injuries, diseases, OSH related expenditures and compensations, effects on labor productivity, psychological and physical

damages on employees as well as other harmful results of OSH impairing practices are considered as dependent variables.

3.11. Data Analysis Methods

The collected primary and secondary data was analyzed and presented in a way that helped the researcher to answer the research questions and meet the objective of the study. The researcher employed both qualitative and quantitative data analysis methods. In most types of research studies, the process of data analysis involves the following three steps: preparing the data for analysis, analyzing the data, and interpreting the data (Marczyk et.al. 2005). Accordingly, the preparation of all the relevant data was carefully done; the collected data was analyzed using both inferential and descriptive statistics (mean, frequency, and percentages) for quantitative data and narrative forms for qualitative.

Data analysis packages such as SPSS version 20 and Microsoft Excel as well as statistical tools such as figures, tables, graphs, charts and diagrams were also employed for better interpretation of the analysis. Pearson's chi-square test and Crude Odds Ratios (COR) with corresponding 95% Confidence Intervals (CI) were calculated to find correlation between independent and dependent variables. A P-value of <0.05 was measured as statistically significant. Moreover charts and Fish bone diagrams were employed to analyze the vital causes of occupational accidents and diseases as well as to assess their grass root causes respectively.

Accordingly, the results from structured interview are integrated with the responses of employees through questionnaires as well as outcomes of direct observation and analyzed in brief vis-à-vis the theoretical frame work of the study. Finally, the interpretation of the analysis result was done to reach at valid conclusions. The employed research design process flow & methodology is shown in Fig. 3.1

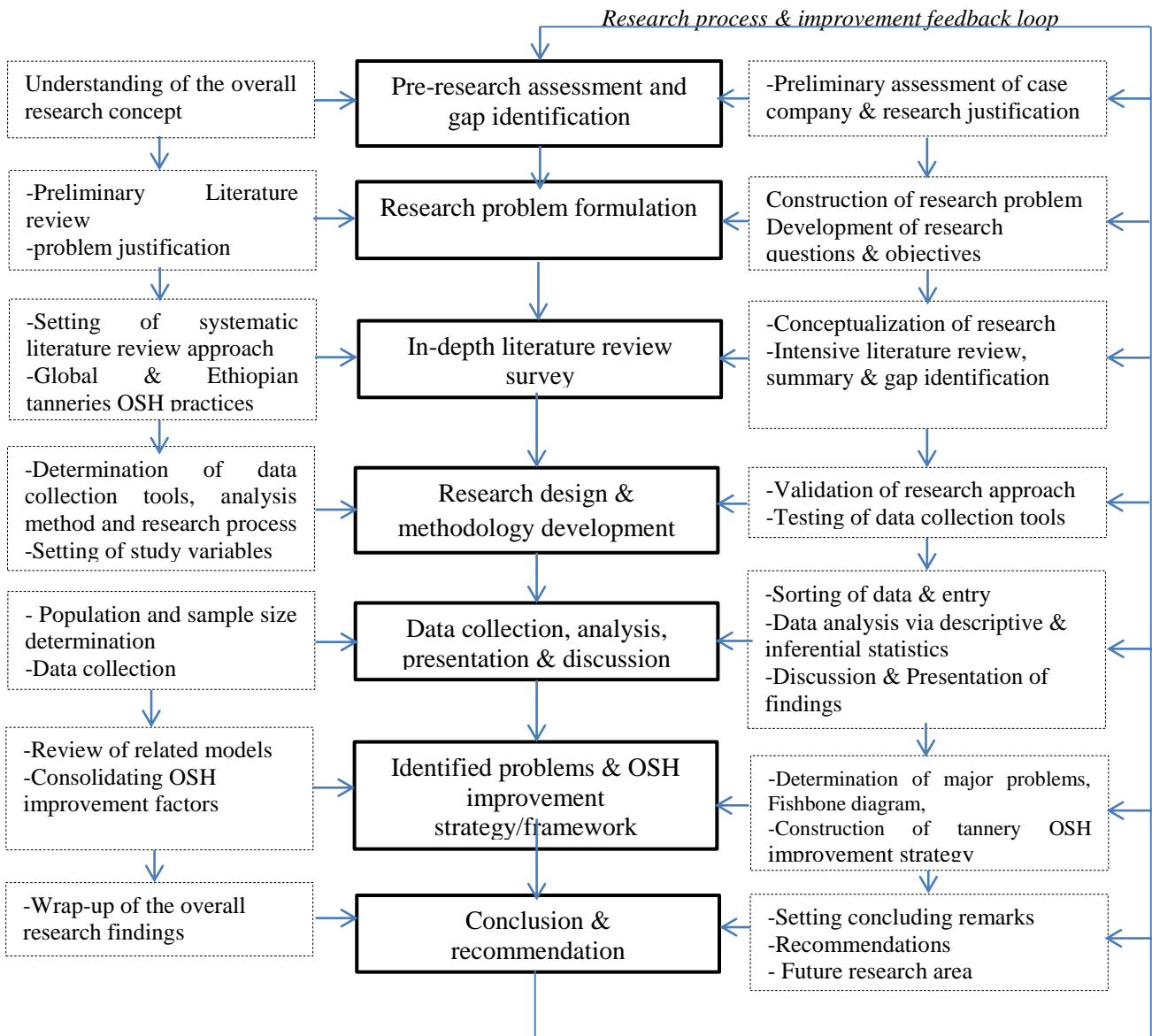


Figure 3.1: Research Methodology & Design process-

CHAPTER FOUR

4. DATA ANALYSIS AND PRESENTATION

4.1. Introduction

This chapter presents the data collected from questionnaires, interviews, tannery site observation and company records including reports, manuals and procedures that helped to rationalize the propose OSH improvement strategy. In addition to demographic, behavioral and environmental factors and their effect on occupational accident and illness exposure, this chapter signified the current OSH practices within the case tanneries, identified major occupational accidents and illness, and their effect on employees' productivity as well as the predisposing factors leading to accidents and disease. Besides, OSH related expenses, level of management commitment; employee awareness and involvement towards OSH practices were also explored.

4.2. Analysis of Data from Questionnaire

4.2.1. Response Rate

Based on the calculated sample size 223 questionnaires were administered and 214 were returned, from which 208 questionnaires (93.3% of the targeted population) were properly filled and used in the study. More than ninety-three percent of the targeted respondents participated which makes the study reliable. (Table 4.1)

Table 4.1: Summary of Questionnaire survey

Case tannery name	Questionnaires distributed	Questionnaires collected	Valid responses	Response rate
Awash Tannery	168	161	158	94%
Abyssinia Tannery	55	53	50	90.9%
Total	223	214	208	93.3%

(Source: Own survey, August-Sep., 2020)

4.2.2. Demographic Characteristics of Respondents

This part presented the background information of the respondents who participated in the study. The major demographic factors assessed in this study are age, gender, service time, educational level, working unit and salary of respondents.

Table 4.2: Demographic characteristics of respondents

Variable	Characteristics	Frequency	Percentage
Gender	Male	130	62.5%
	Female	78	37.5%
Employment pattern	Permanent	164	78.8%
	Temporary/contract	44	21.2%
Age	below 20yrs	7	3.4%
	20-29 years	59	28.4%
	30-39 years	53	25.5%
	40-49 years	48	23.1%
	50 -55years	35	16.8%
	56 years and above	6	2.9%
Salary	Below 1000	4	1.9%
	1001-3000 birr	79	38.0%
	3001-5000 birr	92	44.2%
	5001-7000 birr	24	11.5%
	7001-10000 birr	7	3.4%
	Above 10000 birr	2	1.0%

As indicated on Table 4.2 with regard to sex of study participants the majorities were male that is 62.5 % and the remaining respondents were female which takes 37.5 %. The findings revealed that there are more male workers than female this might attribute to the labors nature of tannery work as it requires reasonably energy and fitness of workers on the job. The male dominated tanneries work environment is in line with the findings of (Karakuzu and Elmal, 2019; Teklit 2016; Abera &Yeshmebet, 2020).

In relation to employment pattern majority (78.8 %) of them were permanent workers the remaining 22.2% were contract/ temporary workers. With reference to age of respondents, 28.4 % of the employees belonged to the age group of 20-29 years followed by the 30-39 years group in 25.5 % and 40-49 years age group in 23.1 %. The remaining 50-50 years and above 56 years age group constitutes 16.8% and 2.95 respectively. Majority of respondents were below age of 50 (80.3%), indicates most of the employees are relatively young. The last part of the table indicates the salary of respondents accordingly majority, 44.2 % of them fall under 3001-5000 birr category followed by the 1001-3000 birr category in 38%. While, 11.5% of participants fall under 5001-7000 birr category and the remaining 1.9 % and 1 % of employees fall within the range of two extremes below 1000 birr and above 10,000 birr respectively. The collected data justified that the very majority, 84.1% of respondent’s salary fall within the range of 5000 and bellow (Table 5.2).

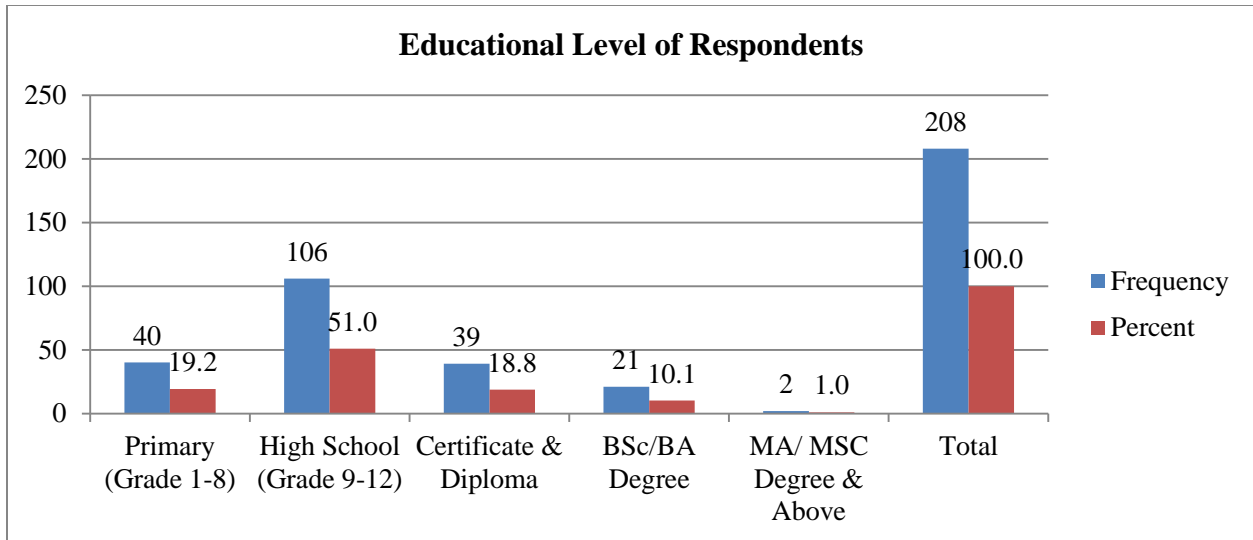


Figure 4.1: Educational status of respondents

The educational background is shown on Fig. 4.1. The majority (51%) attended high school education, 19.2% completed primary school and 18.8% has certificates and diplomas. The remaining 10.1% and 1% of respondents are B.Sc. /BA and M.Sc. / MA degree holders respectively. The findings uncovered that majority (89%) of the respondent’s educational status ranged between elementary school to TVET certificates (Diploma). The other interesting finding is that none of the respondent was registered as illiterate.

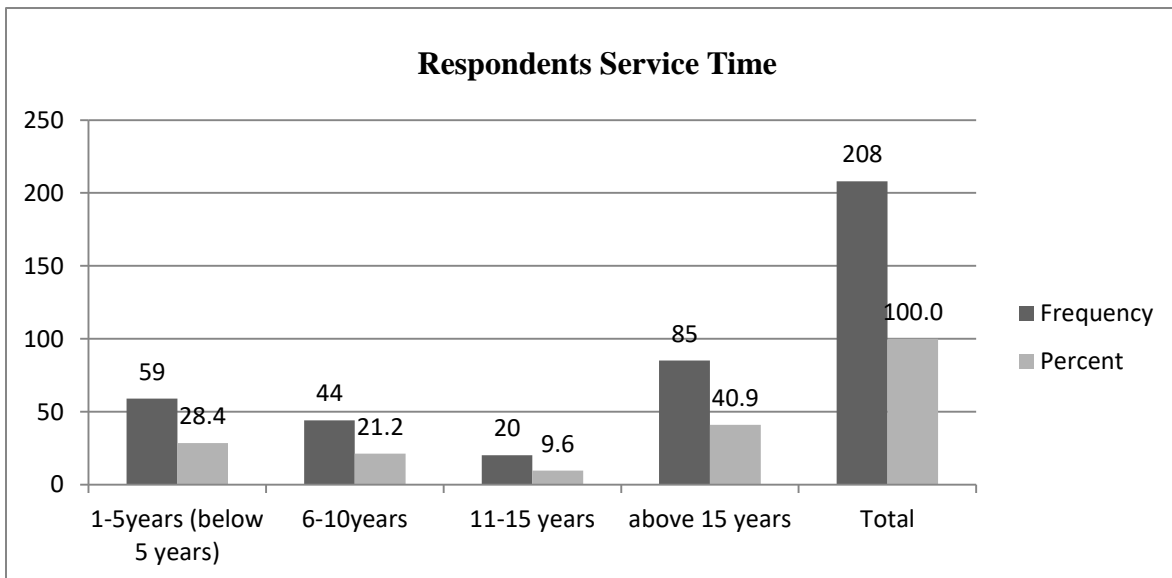


Figure 4.2: Service Time of Respondents

Service time of respondents is presented on Fig. 4.2. Majority 85(40.9%) had more than 15 years' work experience, the remaining 59(28.4%), 44(21.2%), 20 (9.6%) served for ≤ 5years, between 6-10 years and 11-15 years respectively in the case tanneries. The findings point out that the case tanneries constitute highly experienced workers.

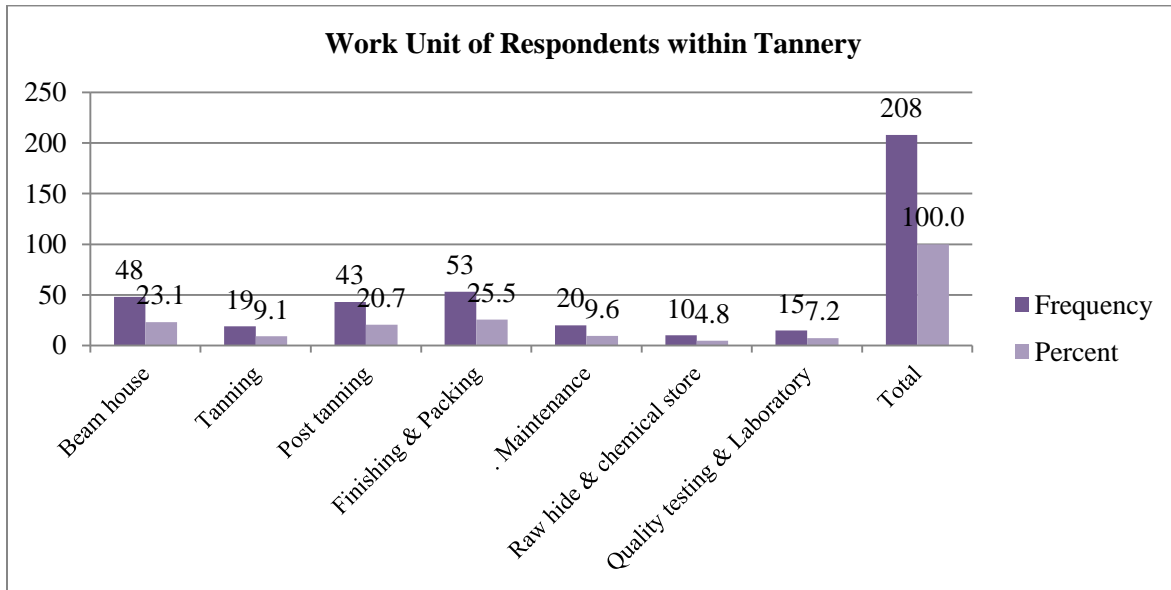


Figure 4.3: Respondents Work Division/Unit

Regarding their work unit, 25.5% work in finishing and packing unit, 23.1% work in beam house, and 20.7% in post tanning section and 9.6% are assigned in maintenance department. The remaining 9.1%, 7.2% and 4.8% of the respondents worked in tanning, quality testing laboratory, raw hide and chemical stores respectively. The results indicate that majority (78.4%) of the respondents work in the production which comprises of beam house, tanning, post tanning and finishing & packing. The work division of all the participants' is presented in Fig.4.3.

4.2.3. Behavioral Analysis of Respondents

Many researches on the area has depicted the significant association between behavioral factors such as, culture of PPE usage, substance abuse, job satisfaction and industrial injuries and illness injuries as (Gebremichael et al., 2015; Yitagesu et al., 2014; Seyoum, 2014; Asrat and Dagachew, 2017; Eshete, 2020; Islam et al. 2017). Hence, this part of the analysis deals with behavioral aspects of the participants.

4.2.3.1. *Employees Awareness Level Regarding OSH*

A question regarding employees awareness level in relation to OSH aspects was raised to respondents since alertness to the subject matter has a significant influence on the safety and health practices as well as employees exposure to occupational injuries and illness.

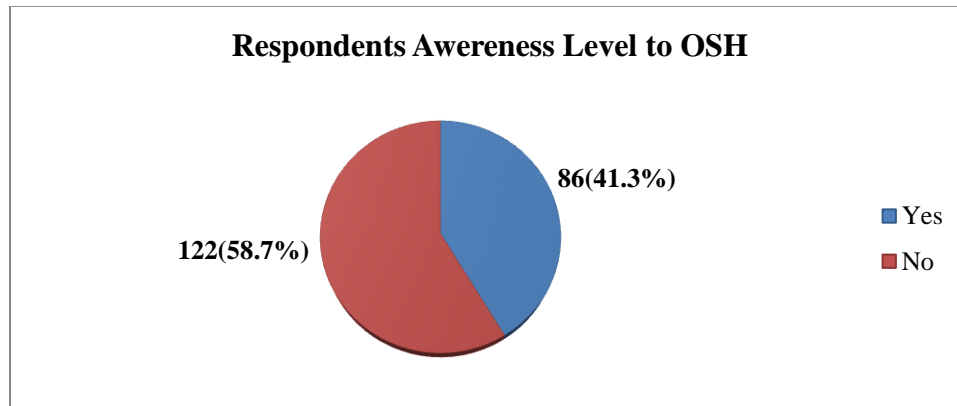


Figure 4.4: Level of awareness to OSH aspects

As illustrated in Fig. 4.4, only 41.3% (86) of the respondents responded as they have awareness about occupational safety and health issues, whereas, 58.7% (122) of the have no awareness. Moreover, 62.8% of female and 56.1% male respondents don't have awareness to OSH aspects. This is an indication that the company is expected to do a lot on alerting all employees of the case tanneries about OSH concepts at large and in particular to female employees. Workers should be aware of hazard protection mechanisms as well as maintenance of safe and health working environment. The outcome also highlights the urgent necessity to improve awareness of employees on the subject. The results, lack of OSH awareness by majority of case tanneries employees are not in agreement with the findings of studies by (Gyan et al., 2020, Teklit, 2016) in which majority of the workers have good knowledge of OSH practice.

4.2.3.2. *Respondents PPE Usage Rate*

Regular use of PPE has a great impact on the safety and health outcomes of tannery workers. Fig. 4.5 displays rate of regular usage of PPE's in the tannery. Majority 139(66.9%) of participants used PPE'S on a regular basis whereas, 56(26.8%) of respondents didn't use PPE's regularly and 13 (6.3%) didn't respond to the question. The results also exposed that 32% and 23.8% of female and male respondents respectively did not use PPE's regularly.

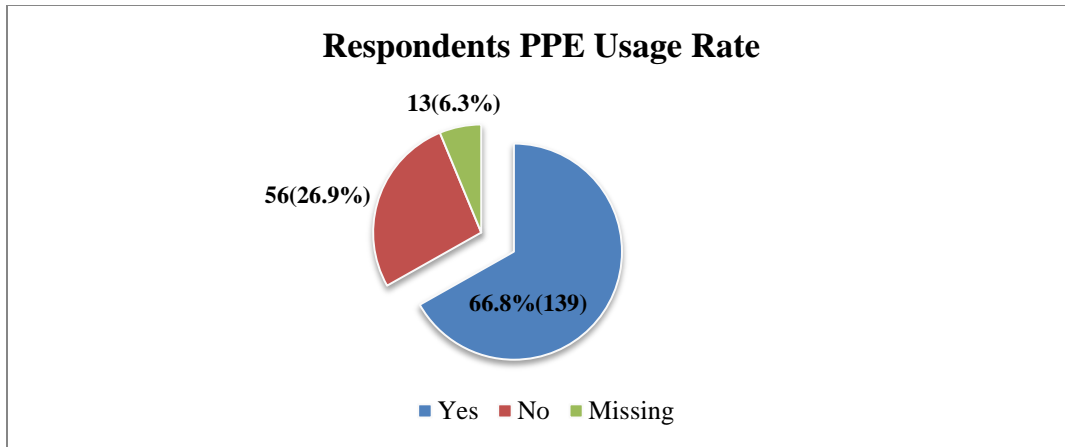


Figure 4.5: Personal protective equipment usage rate

The use of PPE by majority of employees is in line with the findings of Teklit, (2016) and different from that of Islam et al. (2017); Basak et al., (2019) where most of employees not used PPE's. However the effectiveness of PPE's depends on its suitability & proper usage for the designed job. In this regard employees were asked for type of PPE's they have used in their tannery and discussed below.

4.2.3.3. Type and Usage Rate of PPE's

Types of PPEs respondents used are presented on Fig. 4.6, the most common ones were found to be safety boots, cloth and Gloves in 32%, 22.1% and 17% respectively. Dust mask, face shield, helmet, goggles and ear plugs were used in 8.7%, 5.9%, 5.5%, 5.1% and 3.2% respectively. One participant claimed as he only used overcoat at his work.

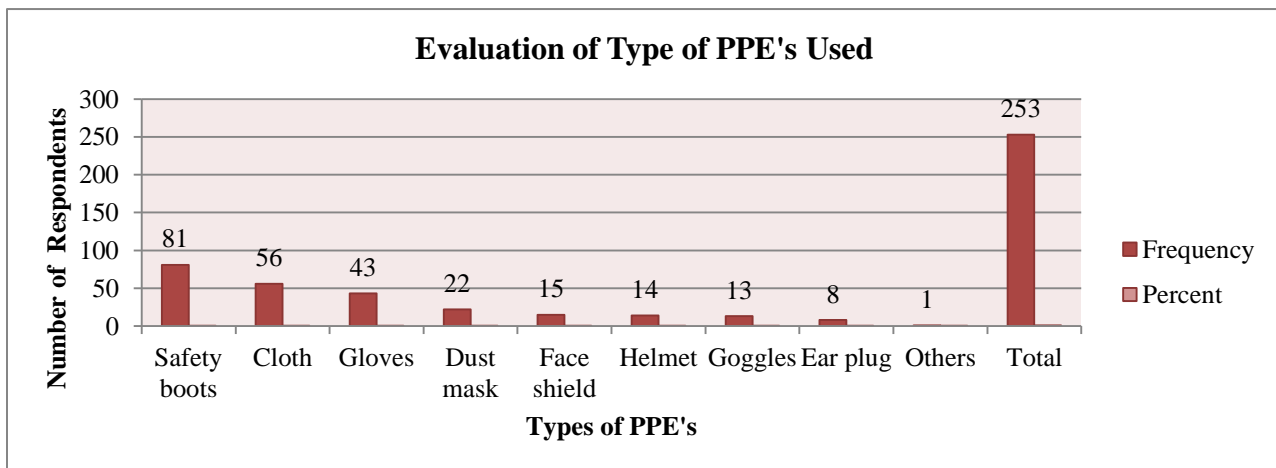


Figure 4.6: Type of PPE used and rate of usage

The results exposed the company has focused more on provision of common safety devices such as boots and cloth however tailor made provision of PPE's based on the specific requirements of the job within the tannery is mandatory to obtain the expected protective results. Hence, in advance of PPE's purchase risk identification and PPE types required for each unit need to be performed.

4.2.3.4. Reasons of not using PPE

To recognize the core reasons behind absence of regular PPE usage question was raised for participants on the issue and the results were illustrated on Fig. 4.7, the major ones were unsuitability, inaccessibility and lack of comfort of PPE's constitute 33.9%, 23.2%, and 23.2 % respectively. Negligence and lack of awareness in using PPE's have taken 7.1% and 3.6% respectively. The remaining 8.9% gave different reasons such as, lack of periodic provision, transferring PPE's to other parties due to economic reason (by employees) and obsolescence due to long time usage.

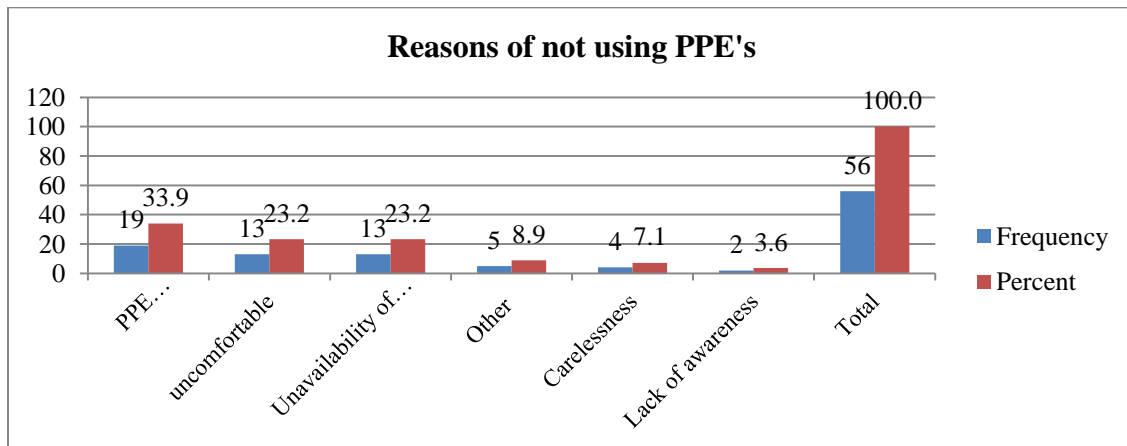


Figure 4.7: Reasons for not using personal protective equipment

Since most of the issues can be solved by trainings and awareness programs, strict follow up and budget allocation the management should strive towards solving them and hence promote employees regular PPE usage and ensure their safety and health. Besides, the quality and suitability of the PPE's should be checked prior to mass procurement.

4.2.3.5. Employees Job Satisfaction status and cause of dissatisfaction

Researches on the area revealed that industrial safety and health measures have significant relationship with employees job satisfaction such as Abera &Yeshmebet, (2020); Asfahi and

Resnik, (2010); Asrat and Dagachew (2017); Seyoum, 2014., accordingly respondents were asked whether they are satisfied or not on their assigned job within the tannery. The results justified that the more than half (53.4%) of participants reacted that they were not happy on their assigned job. While the remaining 44.7% admitted as they were happy with their respective jobs (Fig .4.8). Consequently, 53.8% of the male respondents and 52.5 % of the female respondents were dissatisfied on their job.

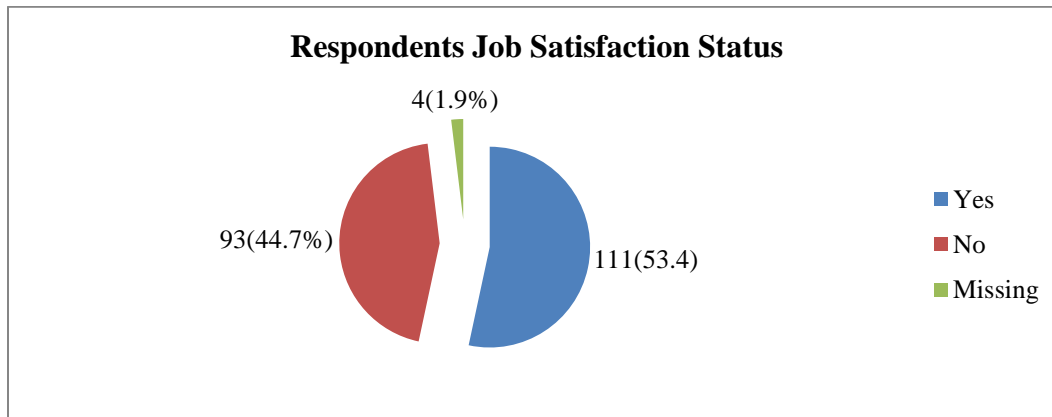


Figure 4.8: Respondents job satisfaction rate

Besides, those who claimed as they were not satisfied on their job were allowed to mention their reasons of dissatisfaction. Among the many reasons stated by participants mismatch between amount of work and their wage, lack of promotion, absence of safe working environment, mistreatment by immediate boss and lack of impartiality were the major ones. Hence, the company should be committed and work hard to halt or minimize the identified causes for dissatisfaction to maintain physiological wellbeing of employees and thereby their performance.

4.2.3.6. Workers Substance Usage Rate during Working Days

As pointed out on many researches of the area from the behavioral factors that lead employees to work related injuries substance usage, such as alcohol consumption, chewing chat and cigarette smoking are among the major ones (Islam et al. 2017; Yiha & Kumie, 2010; Eshete, 2020). In this respect a question was raised to respondents whether they have used any substances at their work place. As indicated on Fig. 4.9, majority (78.4%) of them responded as they hadn't used any of the substances mentioned. Whereas, only 13.9 % of the study participants admitted as they had used to take chat, cigarette or alcohol during working hours. Other 9(4.3%), of

participants responded for other option which mainly includes coffee and tea addiction. The remaining seven (3.4%) respondents were refused to give a response on this issue.

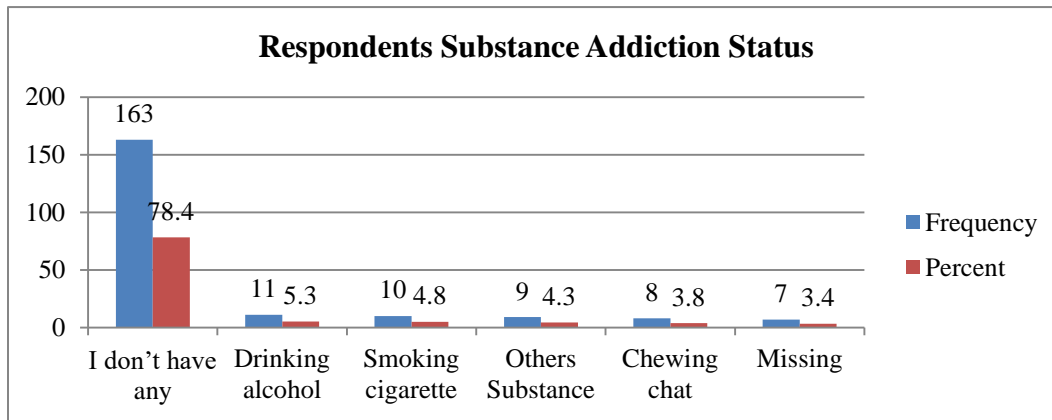


Figure 4.9: Rate of substance addiction

The outcomes of the analysis revealed that only very few of the respondents admitted as they were accustomed to substance usage, however the results of interviews analysis revealed that there were accidents happened due to alcohol and chat usage especially on the night shifts. Hence, the researcher is suspicious that since admitting substance use is a cultural taboo in our setup many respondents may hesitate to expose the truth.

4.2.4. Analysis of Environmental Characteristics

Environmental factors such as working more than 48 hours per week, absence of health and safety training were found to be significant factors that contributed to the predominant occupational injuries (Yiha & Kumie, 2010 as cited in Eshete, 2020).

4.2.4.1. Employees Working and Rest Hours

Among the many factors that affect worker's exposure to work-related injury and illness is duration of time they engaged to work (Gyan et al., 2020;Khurram, 2006), hence respondents were asked for the duration they work per day as well as rest days they have per week. As indicated on Table 4.3 majority 116 (55.8%) replied as they have been working for 8hr. /day and the other 64 (30.8%) responded as they were working above 8hr. /day which is above the standard work time and obviously make workers to feel tired and vulnerable to injuries. The other 18(8.7%) of them replied as they have been working below 8hr. /day, while the remaining 10(4.8%) of them didn't answer for the question. In line with this for the question how many

days per week do you rest from your work 135(64.9%), 34(16.3%) and 32(15.4%) of respondents replied as they have rest for one day/week, 2 days/week and above 2 days/week respectively. While the remaining 32(15.4%) opt for other. Those who opt for other option answered as they have been rest for 1 &1/2 days per week and 4 respondents didn't give any response for the question.

Table 4.3: working hours and rest days of respondents

<i>Working hours/day</i>	Frequency	Percent	Cumulative Percent
Below 8hrs	18	8.7%	8.7%
8hrs	116	55.8%	64.4%
Above 8hrs	64	30.8%	95.2%
Missing	10	4.8%	100%
Total	208	100.0%	
<i>Rest days/week</i>			
One day	135	64.9%	64.9%
2 days	34	16.3%	81.3%
Above 2 days	3	1.4%	82.7%
Others	32	15.4%	98.1%
Missing	4	1.9%	100%
Total	208	100.0%	

4.2.4.2. Availability & Frequency of Trainings Related to OSH

A question concerning availability of trainings in relation to OSH were raised to respondents accordingly majority of them 148 (71.2%) reacted as they didn't have taken trainings regarding occupational safety and health in relation to their job within the last two years, 47(22.6%) of the respondents replied that they had taken safety and health training related to their job. The remaining 13(6.3%) of study participants refused to give responses. Regarding the frequency of trainings among those who said yes 39 of them reported as they have taken only a single training and 8 of them informed as they have taken 2 trainings with in the last two years related to OSH (Fig. 4.10).

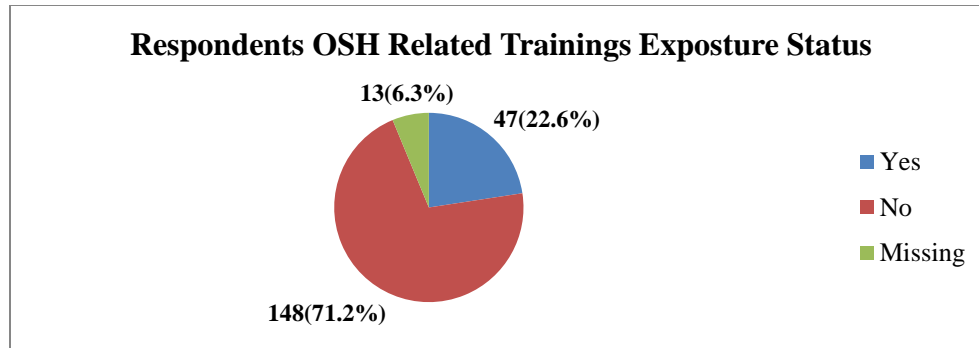


Figure 4.10: Rate of OSH related trainings availability

Both findings, limitation on accessibility of OSH related trainings and weak frequency of awareness programs are indications that there is a huge limitation towards provision of awareness programs as well as involvement of tannery employees in OSH practices. As depicted on many studies including (Karakuzu and Elmal, 2019; Fadwa, 2017; Eshete, 2020) provision of trainings related to OSH aspect has significance impact in cultivating employee’s awareness and minimizing their exposure towards injuries and illness. Hence, the company should allocate the necessary budget and resources towards provision of tailor made (job specific) trainings for employees.

4.2.4.3. *Tanning Machineries & Equipment’s Safety Status & Associated Factors*

As discussed on the literature part of this study machineries and equipment’s safety status is among the main factors that critically affect the wellbeing of tannery employee’s (Wagenaar and Groeneweg, 1987; Anon, 2007; Islam et al., 2017). In this aspect beside direct observation made on the tanneries production floor respondents were invited to reflect their opinion regarding the safety status of the tanning machineries as well as cause of insecurity. In this respect as illustrated on Fig.4.11 majority of participants 137(65.9%) replied as the machineries used for their work were unsafe, 61(29.3%) responded as they were safe for work and remaining 10(4.8%) reserved to respond for this issue.

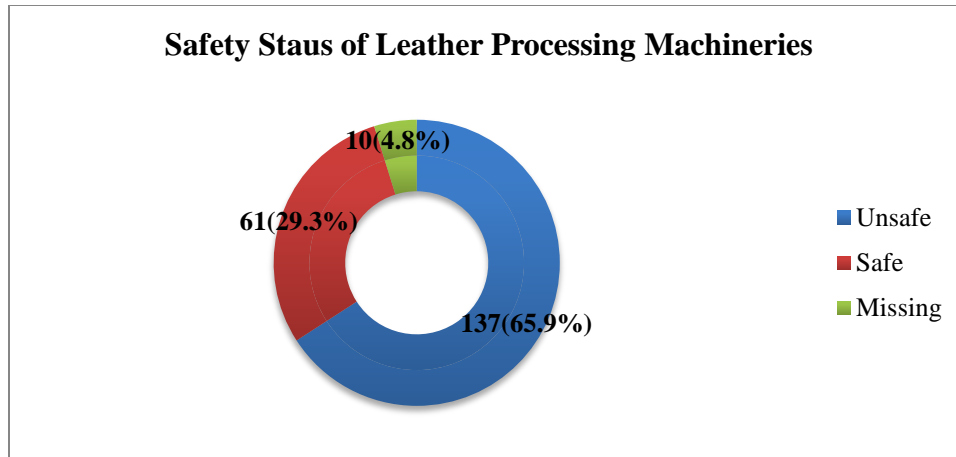


Figure 4.11: Leather processing machineries safety evaluation

Among those who reacted the tanning machineries they used were unsafe for work they also replied for cause of tanning machineries hazardousness. As illustrated on Fig. 4.12 the most common reasons listed by participants in relation to machineries unsafely are frequent breakdown 53(25.5%), obsolescence 49(20.3%), dysfunctional protective mechanisms 44(18.25%) and absence of regular preventive maintenance 38(15.8%). While other reasons lack of operation knowhow and negligence constitute 30(12.4%) and 18(7.5%) respectively. The remaining 9(3.7%) stated other reasons different from the one stated on the questionnaire such as lack of spare parts and maintenance knowhow, loose electrical connections and dismantled drum doors.

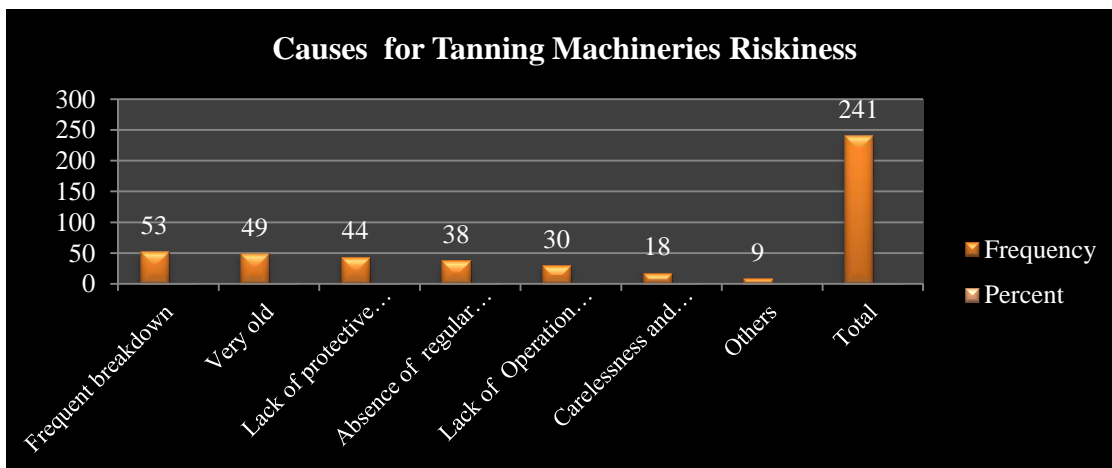


Figure 4.12: Degree of causes for tanning machineries hazardousness

As it is observed on the findings, most of the causes are related with oldness of the tanning machineries, (triangulation via direct observation also proved the condition) hence the case company should give due consideration in replacing them with new ones, ensure functionality of the safety guards and conducting periodic PM to ensure wellbeing of its workers.

4.2.4.4. Management Commitment and Supervision of Safety Rules

Employees were asked regarding the degree of their tannery’s management commitment in implementing effective OSH practices. Among the participants, 85(40.9%) workers reported the management is uncommitted, 56(26.9%) replied committed, 54(26%) answered very uncommitted and 9(4.3%) refused to give response and the rest 4(1.9%) confirmed as the management is very committed in relation to tannery’s OSH practices (Fig .4.13). The findings revealed that majority 139(66.9%) of the workers confirmed that as the management lacked commitment in ensuring effective safety and health practices within their tanneries. However almost all researches on the area emphasized commitment of all levels in the management are critical for the success of OSH practices (Shekh, 2015). Subsequently, one of the indicators of management commitment is conducting regular supervision considering these respondents were asked whether there is regular supervision towards proper implementation of safety rules. Consequently, most 118(56.7%) reported no, while 79(38%) replied yes and remaining 11(5.3%) refused to give response on this issue.

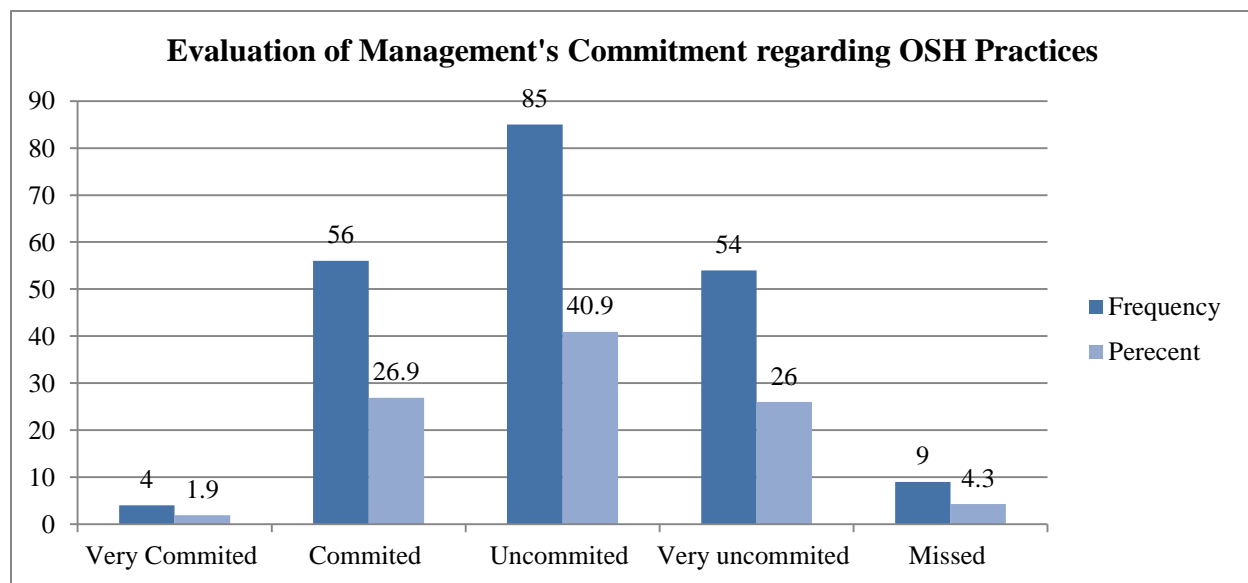


Figure 4.13: Level of Case Tanneries management commitment towards OSH

Both analysis results revealed that, majority 139(66.9%) and 118(56.7%) of them argued that as the management is not committed in OSH issues as well as no regular supervision regarding safety rules respectively. This is an indication that there is a huge limitation with respect to the management’s commitment towards effective implementation of OSH tanneries safety practices. Hence, the management should confirm its commitment through considering the OSH aspects as equal as the other business and productivity aspects of the company.

4.2.4.5. Tanneries Workplace Condition Level

Realizing long term productivity is difficult to realize in poor working conditions where employees are unprotected to health and safety hazards (ILO, 2014), hence respondents were questioned for the comfort level of their tanneries work environment and four sets of comfort levels are used for each tannery’s environmental factor. The representative scales are: very comfortable, comfortable, uncomfortable, and very uncomfortable. The results obtained for each environmental factor are illustrated on Fig. 4.14. Merging the results for very uncomfortable and uncomfortable among the total respondents majority, 76.9%, 68.2%, 58.1%, 56.3%, 52.4% and 50.9% were unease about facilities, smell, PPE’s, noise, ventilation and layout of their tanneries correspondingly. On the contrary, among the participants 37.5%, 33.2%, and 18.8% were in ease with regard to temperature, first aid & clinic related services as well as lighting respectively.

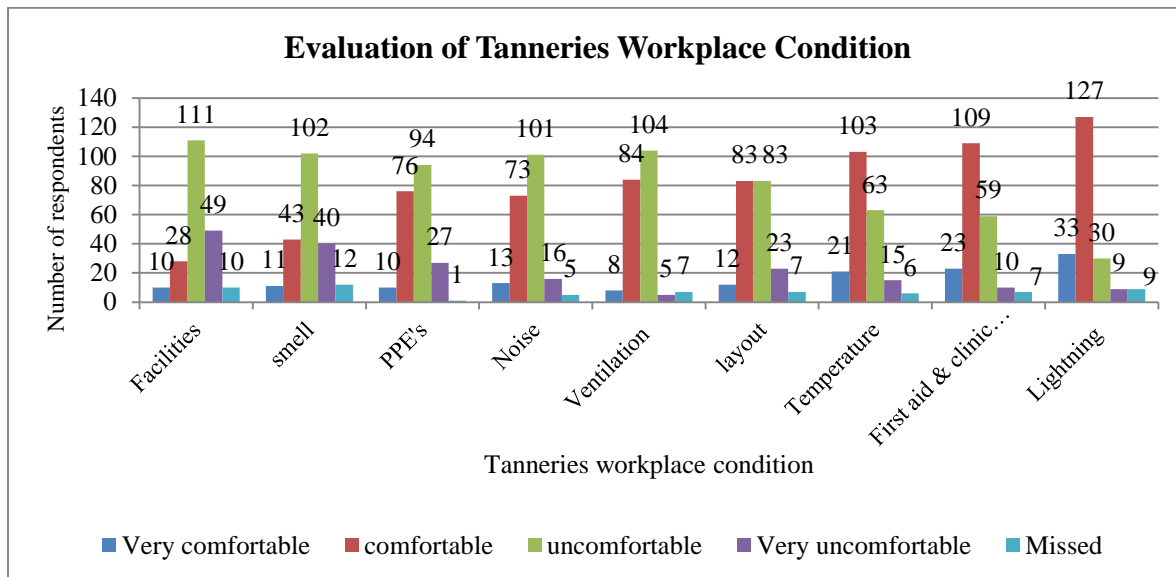


Figure 4.14: Level of comfort for tanneries work place condition

The results revealed that the company has to do a lot on improving the tanneries working condition especially facilities such as canteen, toilets as well as bad smell generated from the tanning process, PPE's, noise and layout of the production system which employees were uneasy most. Consequently via improving the working conditions the company not only maintains the wellbeing of its employees but can also create more satisfied workers with improved productivity and better performance.

4.2.5. Analysis of Work-Related Accidents & Associated Factors

In this part the major occupational injuries employees of the case tanneries frequently faced, their major causes as well as the most common body parts injured due to work-related accidents are presented and discussed. In addition association and magnitude of impact between employee's accident exposure and demographic, behavioral as well as environmental factors are analyzed and presented.

4.2.5.1. Major Occupational Accidents and their Magnitude of Incidence

Response from study participants revealed that from the total respondents 72(34.6%) and 67(32.2%) of them reacted as they have never encountered any accident and illness respectively in relation to their tannery's job. While, majority 136 (65.4%) and 141(67.8%) of them claimed as they have faced at least one work-related injury and illness in their tannery during the study period (Fig. 4.15). The high occupational injuries and illness prevalence rate is different from the findings of Gyan et al., (2020), where only 11% of respondents faced injuries within 12 months of study period and similar with Islam et al., (2017), where 63.3% of workers were affected with at least one health problems and a bit higher than that of (Yewaydemam, 2012) in which 45% of the workers were exposed to injury.

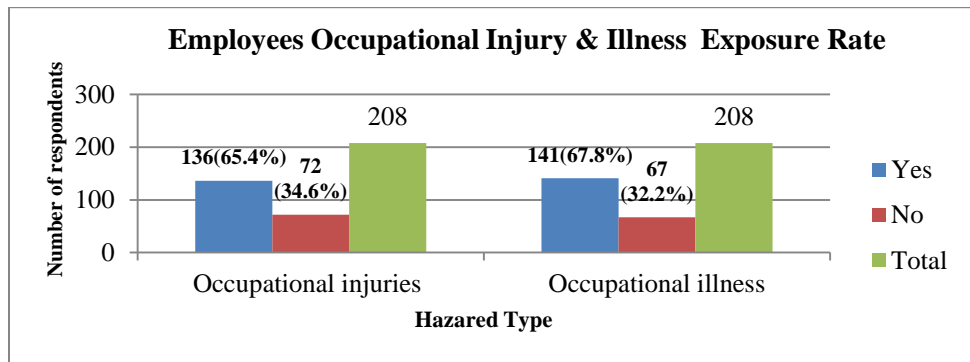


Figure 4.15: Work-related injuries & illness exposure rate of Respondents

The results indicated that as majority of employees experienced both injuries and illness at least once with in the period of the study in relation to their job. This is an indication for the tanneries weak OSH practices and impact on workers wellbeing. Hence, the company should revise its OSH practices and develop an intervention plan to improve the situation. In order to identify and determine the major work-related accidents that employees of the case tannery’s suffered from a question was raised for respondents that constitutes the type of accident and magnitude with four scales of measurement (most of the time, sometimes, rarely and never), therefore the results of the findings are demonstrated on Fig .4.16.

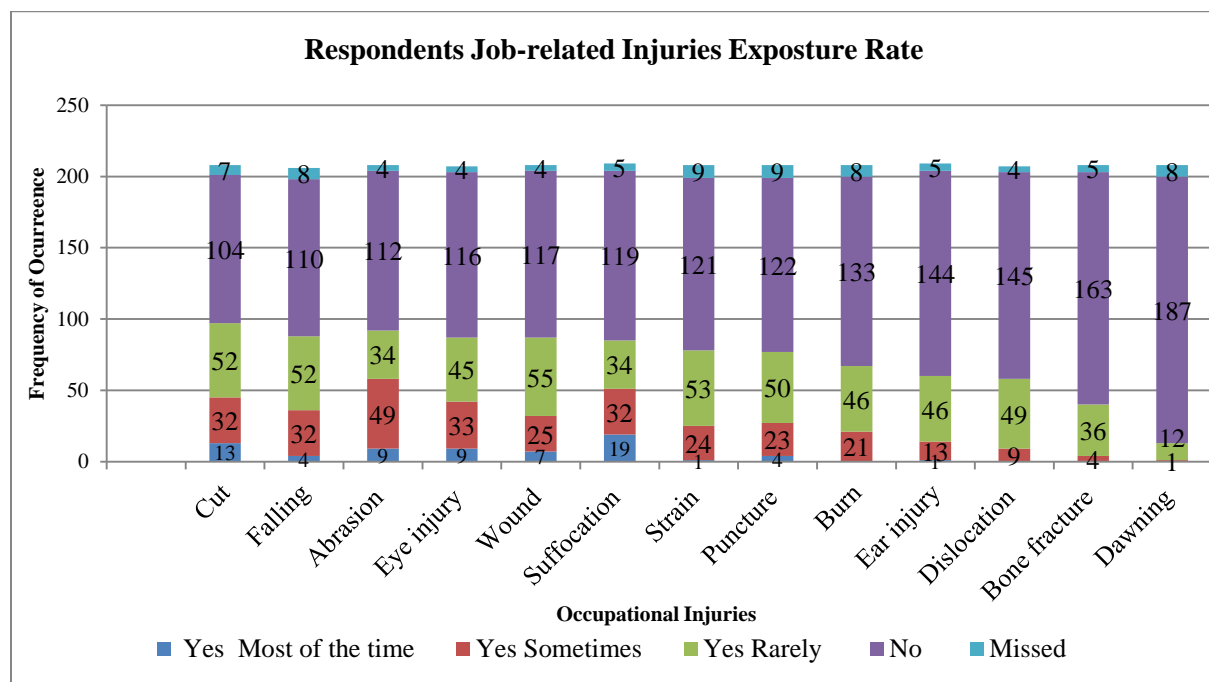


Figure 4.16: Work-related injuries exposure rate of Respondents

The results from the field survey exposed that the major industrial injuries employees of the case tanneries suffered are Cut, Abrasion, Falling, Eye injury, Wound and Suffocation with 46.6%, 44.2%, 42.3%, 41.8%, 41.8% and 40.8% occurrence rate. The results of major injuries are related with study outcomes of (Hailye, 2016; MoLSA, 2015); abrasion and suffocation are allied with study findings conducted in other manufacturing industries such as metal industries (USEFI, 2004; Eshete, 2020); whereas eye injury and abrasion are consistent with textile industries (Damtie & Sira, 2020). Other work-related accidents Strain, Puncture, Burn, Ear injury, Dislocation, Bone fracture and drowning happened at a rate of 37.5%, 37%, and 32.2%,

28.8%, 27.8%, 19.2% and 6.25% respectively (Fig. 4.16). Identifying and determining the major accidents is important that would enable the management of the tanneries to consciously work towards minimizing the injuries and hence maintain the wellbeing of its workers via implementing efficient hazard identification and prevention platform.

Along with the collected data 11 (5.3 %) respondents reported that as they have encountered other types of work related accidents different from the accidents mentioned above the critical ones are chemical splash over their skin which leads to skin burn and heat by drum doors during soaking of raw hides and skin within the beam house.

4.2.5.2. Major Causes of Work-related Accidents

Even though manufacturing industries share common causes of injuries at work place, the reasons of work-related accident and disease differ from industry to industry some accidents are inherent and sector specific. Hence as discussed in literature part of this study there are many injuries that the leather sector suffered in relation to its inherent nature, nature of production and the tanning process. In order to determine and identify the major causes of injuries in which the tanneries employees experienced question was raised for respondents and the results of the analysis are demonstrated in Fig .4.17.

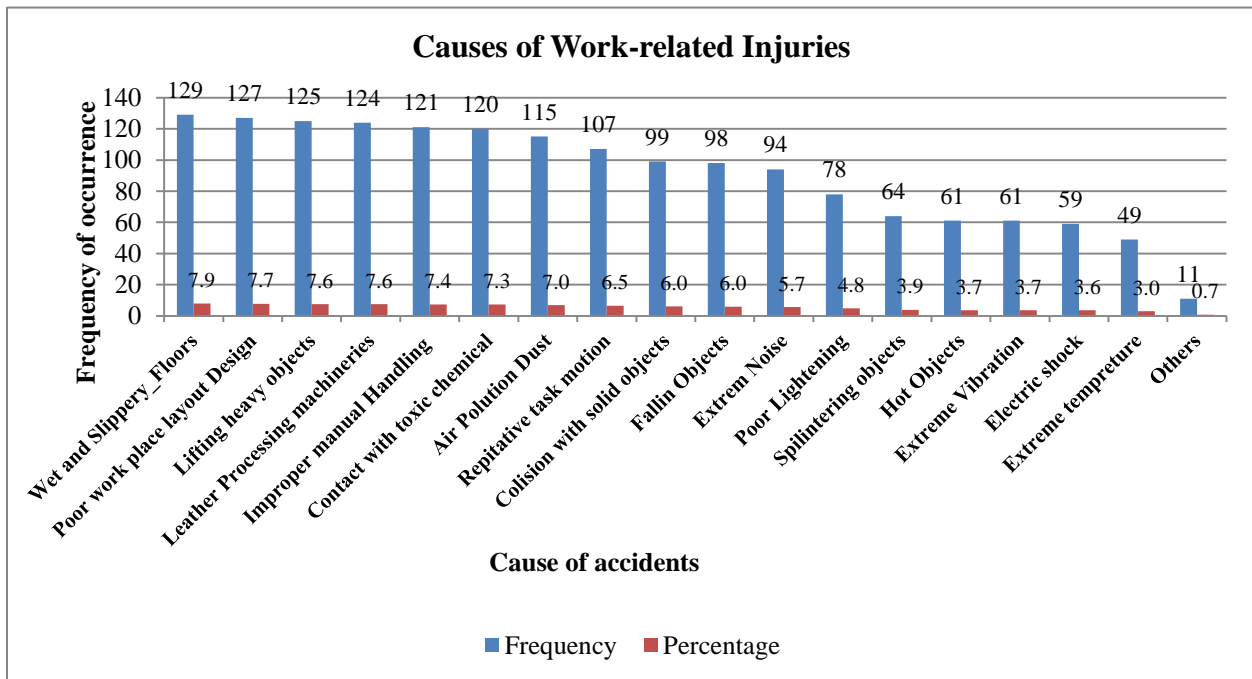


Figure 4.17: Evaluation of causes for occupational accidents

As it can be observed on Fig. 4.17 the major causes of accidents identified via questionnaire survey are wet and slippery floors 129(7.9%), poor work place layout 127 (7.7%), lifting heavy objects 125 (7.6%), tanning machineries 124(7.6%), improper manual handling 121(7.4%), toxic chemical contact 120(7.3%) and dust 115(7.0%). On the other hand repetitive motion, collision with objects falling objects, extreme noise, poor lighting, splintering objects, hot objects, extreme vibration, electric shock and extreme temperature constitute 107(6.5%),99(6%),98(6%), 94(5.7%),78(4.8%),64(3.9%), 61(3.7%), 59(3.6%) and 49(3.0%) consecutively. On the other hand, 11 respondents opt for other causes than mentioned on the questionnaire such as drum doors, blades of fleshing and shaving machines which can be included on the leather processing machineries category. The identified causes are consistent with what has been mentioned as causes for injuries in leather processing industries (USEFI, 2004). Identifying and determining the major cause of injuries help the case tannery management and safety officers to work towards accidents minimization via analyzing and eliminating the root causes of injuries. In this aspect through focusing on the above mentioned causes of injuries in line with the order of their priority the case tanneries can halt work-related injury exposure of employees.

4.2.5.3. Frequency of Body Parts Affected by Job-related Accidents

To determine vulnerability of body parts towards accidents study participants were asked which part of their body affected due to work-related accidents within the last two years. As shown on Fig .4.18 the most commonly affected body parts of workers due to work related accidents are hands, fingers, backbone, leg, toe and knee in 139(66.8%), 127(61%), 118(56.7%), 110(52.8%), 105(50.4%) and 101(48.6%) respectively.

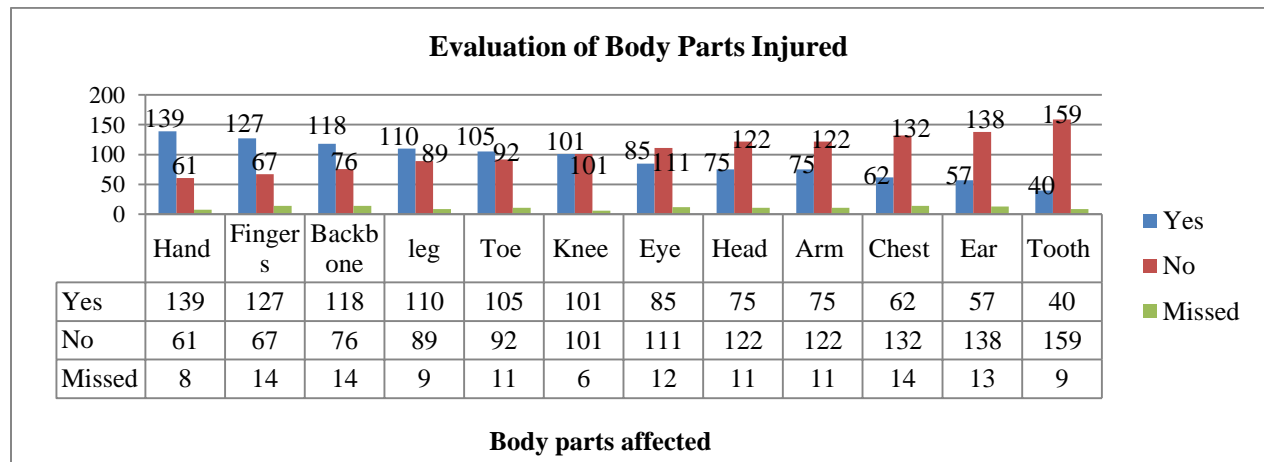


Figure 4.18: Frequency of Body parts affected due to occupation accidents

While, 85(40.8%), 75(36%), 75(36%), 62(29.8%), 57(27.4%) and 40(19.2%) of respondents replied they have got accidents on their eye, head, arm, chest, ear and tooth consecutively. Among the total participants 11(5.2%) of them replied that they have other body parts affected by work related accidents different from mentioned above such as nose, hair and front head.

From the findings it can be recognized that because of the inherent nature of work within the tannery employee's hand and leg associated parts became highly affected body parts. Moreover the results are coherent with the findings of (MoLSA, 2015; Hailye, 2016) with higher percentage of injury on upper extreme body parts. The reason might attributed to as most of the tanning machineries are operated through hand and pedal operations may liable them for more injuries. The results imply that the case tanneries safety personnel's physicians and management should give concern for the problem and take mitigation strategy to halt the problem. Besides the case company should give capacity building and safety awareness trainings for employees engaged in operating the tanning machineries.

4.2.5.4. Effect of Demographic Factors on Workers Occupational Accident Exposure

In order to determine significance of association between demographic factors and employees exposure to accident within the case tanneries chi-square tests were conducted and hence among the factors gender, educational level, working experience, monthly salary and working unit of respondents has shown significant correlation with employee's occupational injuries exposure taking cut-off point ($p = 0.05$). For those demographic factors that has shown significant association, to determine extent of correlation Pearson's chi-square test and Crude Odds Ratios (COR) with corresponding 95% Confidence Intervals (CI) were computed and results of magnitude of correlation between demographic factors and respondents exposure to industrial accidents are illustrated on Table 4.4.

Concerning sex of respondents from the results of bivariate logistic regression, as indicated on Table 4.4 female workers were 2.4 times more likely to be injured than their male counter parts [COR: 2.369, 95%CI(1.259-4.464)]. Despite being fewer in number female workers were found to be more vulnerable to injuries this is in line with the findings of (Damtie &Sira,2020; Innawu, et al., 2019), this might attributed to their less awareness to safety issues as well as PPE usage rate. Among female respondents 62.8% and 32% respondents have no OSH awareness and not use PPE's respectively which are at higher rate compared to their male counterparts.

Table 4.4: Demographic factors and employees exposure to work-related injuries

Demographic factors		Employees who faced at least one occupational accident			COR:95% CI	
		Yes	No	Total		
Gender	Male	76	54	130	1.00	
	Female	60	18	78	2.369(1.259-4.464)*	
Service Time In tannery	1-5 years(≤5 years)	43	16	59	1.00	1.00
	6-10 years	32	12	44	1.00	0.992(0.413-2.387)
	11-15 years	13	7	20	1.00	0.691(0.234-2.040)
	Above 15 years	48	37	85	0.516(0.288-0.992)*	0.0483(0.236-0.988)*
Educational Level	Primary school (1-8)	35	5	40	4.651(1.730-12.5)*	1.00
	High school(9-12)	78	28	106	1.00	0.398(0.141-1.116)
	Certificate and diploma	14	25	39	1.00	0.080(0.026-0.250)*
	BSc/BA Degree	8	13	21	1.00	0.092(0.026-0.323)*
	MA/ MSC Degree &	1	1	2	1.00	
Mode of employment	Permanent	102	62	164	1.00	
	Contract/Temporary	34	10	44	2.066(0.954-4.484)	
Unit of work division	Beam house	38	10	48	2.403(1.117-5.181)*	1.00
	Tanning	13	6	9	1.00	0.570(0.173-1.879)
	Post tanning	30	13	43	1.00	0.607(0.234-1.574)
	Finishing and packing	33	20	53	1.00	0.434(0.178-1.058)
	Maintenance	5	15	20	1.00	0.087(0.026-0.300)*
	Raw hide & skin store	7	3	10	1.00	0.613(0.134-2.809)
	Quality laboratory &	10	5	15	1.00	0.526(0.146-1.894)
Monthly Salary	Below 1000	69	14	83	1.00	
	1001-3000 birr					
	3001-5000 birr	56	36	92	0.315(0.155-0.642)*	
	5001-7000 birr	11	22	33	0.101(0.040-0.255)*	
	7001-10000 birr					
	Above 10000 birr					

*Significant associations ($p < 0.05$)

Most of the study participants have been working for 15 years and above with in the case tanneries and respondents with in this group have shown significant association with occupational injury exposure. Accordingly, respondents who have been working for more than 15 years have almost half less exposure to accidents than respondents within other experience groups [COR: 0.516, 95%CI(0.288-0.992)]. Consequently, employees who have been working

for 5 years and below faced injuries 20 times more than workers who have been working for above 15 years [COR: 0.0483, 95%CI (0.236-0.988)]. This might be attributed to those highly experienced workers have awareness and ability to identify hazardous areas as well as avoid risky way of doing things such as unsafe operation of tanning machineries, safe ETP operations and handling of chemicals and materials than those with less experience. The results give an indication that besides formal trainings experience sharing among employees can help a lot in minimizing injuries.

While, considering educational level of respondents those workers that acquire only elementary education have been exposed to occupational injuries close to 4.65 times than employees within other groups that have higher educational level [COR: 4.651, 95%CI(1.730-12.5)].

Besides employees with in elementary level education group resulted in injuries close to 10.86(1/0.092) times higher than employees with B.Sc. /BA and above educational level [COR: 0.092, 95%CI (0.026-0.323)] and 12.5 (1/0.080) times higher than employees that have certificate/diploma [COR: 0.080, 95%CI (0.026-0.323)]. From the findings it is understandable that employees with lower educational level are expected to have less awareness in many aspects of the industry including OSH and hence much vulnerable to injuries. While, the results are in contrast with findings of, Eshete, (2020) where participants with higher education level are more exposed to injuries than those with less educational qualifications.

Regarding to monthly salary, respondents with less monthly income found to be more vulnerable to injuries than respondents with higher salaries. Consequently, respondents who have got a monthly salary of 3000 birr and below were close to 9.9(1/0.101) and 3.17(1/0.315) times more exposed to accidents than those within a salary range of above 5000 birr/month[COR: 0.101, 95% CI(0.040-0.255)], and respondents within a salary range of (3001-5000) birr/month respectively[COR: 0.315, 95% CI(0.155-0.642)]. The findings are in line with the results of the study by (Islam et, al., 2017). Even though, it needs further investigation the association might be related to the less economic value they earn might lead them to carelessness and unsafe work practices which exposed them for injuries than the high income ones. The observation made also indicated, the low-income (labor workers) are working in poor working condition which make them vulnerable to accidents.

In view of working unit which has also shown significant correlation with worker's accident exposure, employees who have been working within the beam house of the case tanneries have

2.4 times more exposed to injuries than respondents who have been working in other units of the tannery [COR: 2.403, 95% CI(1.117-5.181)]. Again beam house workers were found to be close to 11.49 (1/0.087) times more injured than employees in maintenance section [COR: 0.087, 95% CI(0.026-0.300)], and 2.3 (1/0.434) times than workers in finishing and packing section, [COR: 0.434, 95% CI(0.178-1.058)], Table 5.4. The findings are coherent with the results of other studies in the area that since the beam house operations are consisted of hazardous and wet process including labors drum and fleshing operations that highly exposed employees to injuries and illness. The findings of direct observation made on the tannery operations also support this fact that the beam house areas are slippery floors, old tanning drums with damaged doors, unguarded fleshing machineries and uncomfortable ergonomics and layout.

4.2.5.5. Behavioral Factors and Employees Accident Exposure Rate

The findings of the chi square tests and bivariate logistic regression of collected data revealed that the major behavioral factors, OSH awareness level, job satisfaction and PPE usage rate have shown significant correlation with employee’s work-related accident exposure rate with Pearson values of 0.001, 0.002 and 0.019 respectively.

Table 4.5: Behavioral factors and workers exposure to work-related injuries

Behavioral factors		Employees who faced at least one occupational accident			COR:95%CI
		Yes	No	Total	
OSH related Knowledge	Yes	45	41	86	1.00
	No	91	31	122	2.673(1.485-4.807)*
Job satisfaction	Yes	50	43	93	1.00
	No	83	28	111	2.551(1.410-4.608)*
Regular Use of PPE	Yes	82	57	139	1.00
	No	43	13	56	2.298(1.135-4.651)*

**Significant associations (p<0.05)*

To see the magnitude of association between those significantly associated behavioral factors and job-related injury exposure rate bivariate logistic regression (COR) analysis was performed and the results were presented on Table 4.5. The findings exposed that respondents who replied as they lack awareness regarding OSH found to be close to 2.7 more vulnerable to occupational accidents than respondents that have knowledge about tannery’s OSH aspects [COR: 2.673 95% CI(1.485-4.807)]. Considering job satisfaction level, respondents that are found unsatisfied on their occupation were close to 2.6 times more exposed to injuries than their counter parts [COR:

2.551, 95% CI (1.410-4.608)]. The results of another important behavioral factor which is respondents PPE usage rate discovered that respondents that are witnessed as they were not used PPE's within their tannery operations were 2.3 times more unprotected to injuries than their counter parts who have been using PPE'S on regular basis [COR:2.298, 95% CI(1.135-4.651)]. The above results are in line with most literatures that workers, who have been satisfied on their job, have culture of using PPE's and conscious about OSH aspects are expected to be less vulnerable to injuries (Teklit, 2016; Abera &Yeshmebet, 2020; Asfahi and Resnik, 2010). Results for PPE usage are in contrast to findings from (Damtie and Siraj, 2020).Hence the company should work towards creating better working environment, enriching employees PPE usage culture and their safety awareness to minimize their exposure to injuries.

The findings are logical and in line with many literatures that employees with better awareness towards safety aspects, use PPE's regularly as well as satisfied on their job are expected to have less exposure to industrial accidents and productive.

4.2.5.6. *Environmental Factors & Workers Exposure to Accidents*

Among the environmental factors considered results of chi square tests revealed that safety and health related trainings availability has shown significant association with respondents job related accident exposure with Pearson (P) value of 0.012. In order to decide degree of correlation bivariate logistic regression analysis were performed and results are illustrated on Table 4.6 via COR at 95% CI. The results exposed that employees that have not taken OSH trainings were 2.3 times more likely to be injured than those employees who has exposure to OSH related trainings with in their tanneries[COR:2.341, 95% CI(1.193-4.587)]. The findings are consistent with the results of (Seyoum, 2014).

Table 4.6: Availability of trainings related to OSH and employees exposure to work-related injuries

Environmental factors		Employees who faced at least one occupational accident			COR:95%CI
		Yes	No	Total	
Safety & Health Trainings availability	Yes	24	23	47	1.00
	No	105	43	148	2.341(1.193-4.587)*

*Significant associations ($p < 0.05$)

The results are in harmony with many literatures that provision of OSH training programs are essential and can minimize employee's exposure to industrial accidents, (Othman, 2012; Nathai

and Koonj ,2012). However, majority (71.2%) of workers within the case tanneries have lack exposure to OSH trainings, hence the management should strive hard in conducting training and awareness programs in relation to OSH in a planned and regular manner.

4.2.6. Analysis of Occupational Diseases & Associated Factors

In this part the key occupational diseases employees of the case tanneries frequently faced as well as their associated causes are presented and discussed. In addition association and magnitude of correlation between worker's illness exposure and demographic, behavioral as well as environmental factors are analyzed and presented.

4.2.6.1. Major Occupational Diseases and Magnitude of Prevalence

Responses from the questionnaire survey revealed that among total respondents 67 (32.2%) of them witnessed as they have never encountered any sickness in relation to their job within the tannery and majority 141 (67.8%) of them claimed as they became ill at least once in relation to their tannery work (Fig. 4.15). Alike to the work related accidents here also majority of workers have suffered from illness in relation to their job. This is again an implication that besides affecting the wellbeing of employees it has huge impact on the overall performance of the case tanneries. Hence, the company should review and work towards reversing the situation.

In order to identify and determine the major work-related illness that workers of the case tannery's suffered from, a question was raised for respondents that constitutes the type of disease and degree of prevalence with four scales of measurement (most of the time, sometimes, rarely and never). Accordingly the results of the findings are illustrated on Table 4.7.

As it can be observed on Table 4.7 the main work-related diseases which employees of the case tanneries suffered from are Backache, Headache, Respiratory diseases, skin complications, Dizziness, Asthma, Muscle problems and Allergy with a prevalence rate of 50%, 48.6%, 48.1%, 44.3%, 43.7%, 43.3%, 43.3and 42.9% respectively. Considering their magnitude of incidence headache, respiratory diseases, backache and bronchial asthma happened 'most of the time' with a rate of 16.8%, 15.9%, 13% and 10.6% consecutively. The high occurrence rate of asthma is similar with the findings of (Khurram, 2006). Whereas backache, muscle problems and allergy take place 'sometimes' with a magnitude of 23.1%, 22.1% and 21.2% respectively.

Table 4.7: Rate of Respondents Exposure for Occupational Disease and Magnitude of prevalence

Occupational Diseases faced by Employees	Yes Most of the time	Yes sometimes	Yes rarely	No	Missed
Backache	27(13%)	48(23.1%)	29(13.9%)	94(45.2%)	10(4.8%)
Headache	35(16.8%)	35(16.8%)	31(14.9%)	98(47.1%)	9(4.3%)
Respiratory diseases	33(15.9%)	21(10.1%)	46(22.1%)	100(48.1%)	8(3.8%)
Skin diseases	18(8.7%)	30(14.4%)	44(21.2%)	107(51.4%)	9(4.3%)
Dizziness	4(1.9%)	29(13.9%)	58(27.9%)	106(51.5%)	11(5.3%)
Bronchial asthma	22(10.6%)	33(15.9%)	35(16.85%)	108(51.9%)	10(4.8%)
Muscle problems	6(2.9%)	46(22.1%)	38(18.35%)	110(52.95%)	8(3.85%)
Allergy	18(8.7%)	44(21.2%)	27(13%)	112(53.8%)	7(3.4%)
Depression	4(1.9%)	35(16.8%)	44(21.2%)	114(54.8%)	11(5.35%)
Hypertension	4(1.9%)	31(14.9%)	38(18.3%)	127(61.1%)	8(3.8%)
Sleep related disorder	12(5.8%)	21(10.1%)	36(17.3%)	130(62.5%)	9(4.3%)
Nerve related disorder	0(0%)	19(9.1%)	49(23.6%)	131(63%)	9(4.3%)
Voice related problem	6(2.9%)	14(6.7%)	46(22.1%)	132(63.5%)	10(4.8%)
Nausea and vomiting	5(2.4%)	10(4.8%)	40(19.2%)	144(69.2%)	9(4.35%)
Diarrheal disease	1(0.5%)	13(6.3%)	39(18.8%)	146(70.2%)	9(4.35%)
Acute fever	5 (2.4%)	15 (7.2%)	31 (14.9%)	147 (70.7%)	(10) 4.85
Heart disease	2(1%)	13(6.3%)	34(16.3%)	149(71.6%)	10(.8%)4
Pneumonia	0 (0%)	7 (3.4%)	31 (14.9%)	160 (76.9%)	10(4.8%)
Hepatitis	1(0.5%)	4(1.9%)	32(15.4%)	162(77.9%)	9(4.3%)
Other illness	6(2.9%)	4(1.9%)	1(0.5%)	189(90.9%)	8(3.8%)
Anthrax	0(0%)	0(0%)	3(1.45%)	194(93.3%)	14(5.3%)

The major industrial illness especially headache, skin diseases and asthma are in line with the findings of (Padma et al., 2016; Islam et al., 2017; Mohanta et al., 2012; Atiqur, 2014) Meanwhile depression, hypertension, sleep, nerve and voice related disorders are other work-related illness in which employees suffered from with medium prevalence level of 39.9%, 35.15, 33.2%, 32.7% and 31.7% sequentially. Then again nausea, diarrhea, acute fever, heart disease, pneumonia and hepatitis are observed with less prevalence level of 26.2%, 25.6%, 24.5%, and 23.6% 18.3% and 17.8% correspondingly. Alike the occupational injuries here also recognizing and defining the major work-related illness is significant that would enable the administration of the case tanneries to intentionally work towards diminishing the prevalence of the illness and

hence maintain the health of its employees via implementing efficient OSH identification and prevention policy.

Along with the collected data 11 (5.3 %) respondents described that as they have faced other types of work related illness and the major ones are varicose vein, common cold, and urine related problems.

4.2.6.2. Major Causes of Work-related Illness

Alike the occupational accidents here also the causes for work related illness within the case tanneries were discussed and presented. Subsequently, question was raised for respondents on major causes of job related illness within their tanneries and the results of the analysis are presented on Fig .4.19. From the results it was observed that bad smell 144(9.4%), airborne contaminants 127(8.3%), hazardous chemicals 117(7.6%), working in standing & sitting for long hrs. 116(7.5%), tanning machines 114(7.4%), lack of ventilation 109(7.1%), tedious job 107(7.0%) and raw hide & skin 105(6.8%) were among the major causes of occupational illness within the case tanneries that respondents replied for.

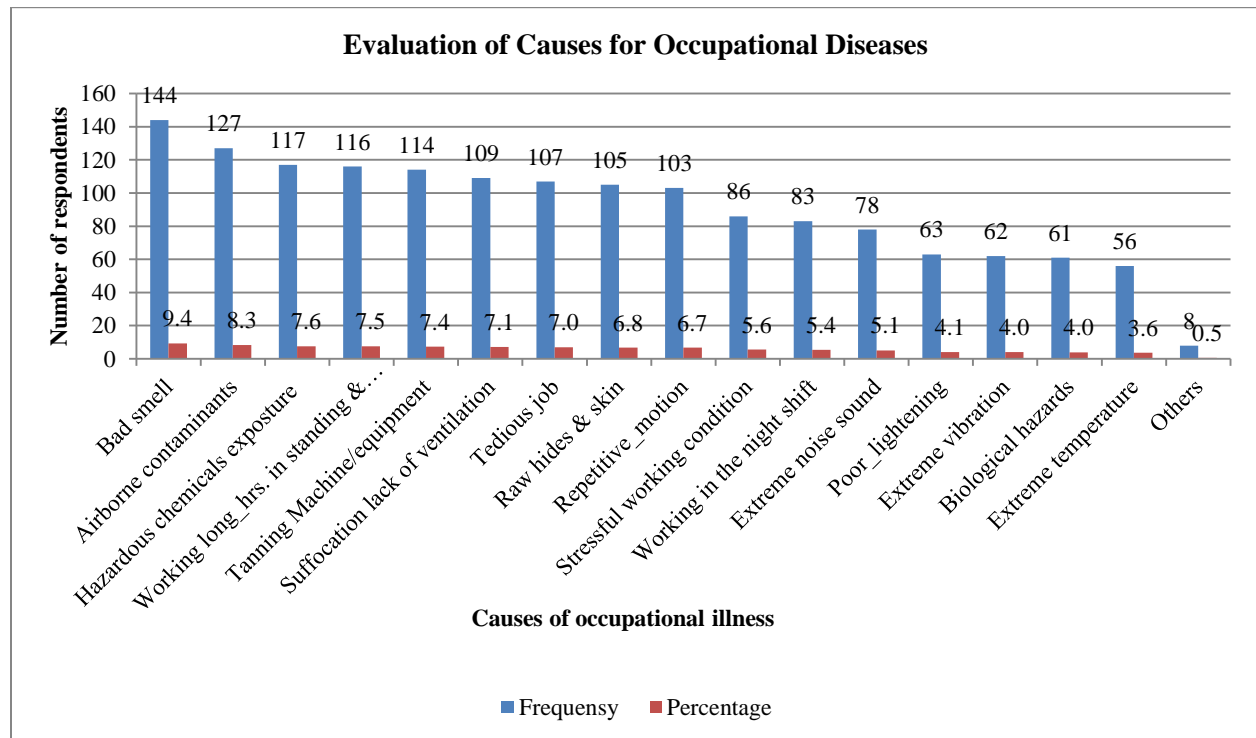


Figure 4.19: Evaluation of causes for work-related illness

Most of the major causes are related with what has been mentioned in (USEFI, 2004). Moreover, from the interview and observation findings airborne contaminants, lack of ventilation, raw hide and skin might attributed to the major observed illness respiratory diseases, bronchial asthma, dizziness, allergy and skin complication. Alternatively repetitive motion, stressful working condition, working in night shift, extreme sound, poor lightening, extreme vibration, biological hazards, extreme temperature take part 103(6.7%), 86(5.6%),83(5.4%), 78(5.1%), 63(4.1%),62(4.0%), 61(4.0%) and 56(3.6%) consecutively (fig .5.19). On the other hand 8 study participants go for other reason than stated on the questionnaire such as fleshing's/ bi –products of semi-processed leather, contaminated water, lack of milk and nutritional food provision which the job demands

Alike job related injuries identifying and analyzing major causes of work-related disease support the tanneries management, safety officers and physicians to work towards illness minimization/ prevention via analyzing and working on the root causes of occupational illness. Hence, working consciously on the above identified major causes of work-related illness in the order of their priority can break or minimize the prevalence and hence maintain the wellbeing of case tanneries workers.

4.2.6.3. Demographic Factors & Workers Occupational Illness Level

Among the demographic factors respondents age, educational level, service time and working unit has shown significant correlation with employee's industrial illness exposure. For those demographic factors that exhibited significant association, there degree of correlation with workers exposure to occupational illness is computed via COR with 95% CI. The findings of the analysis are illustrated on Table 4.8.

Considering age of study participants, those within range of 50 years and above were close to 3.36 times more exposed to work related illness than those below 50 years of age[COR: 3.355, 95%CI(1.335-8.403)]. Again those within age of 50 years and above were nearly 5.5 times more suffered to illness than respondents below 30 years of age [COR: 5.494, 95%CI(2.037-14.705)]. In line with the study results of Islam et al. (2017), respondents within (30-39) years of age were found to be nearly 2.6 times exposed to diseases than those below 30 years [COR: 2.623, 95%CI(1.203-5.714)]. The above findings give an indication that those aged workers are more vulnerable to industrial illness in the tanneries. This might attribute to the younger employees

would have better immunity towards the upcoming health hazards of their work in the tannery than the aged workers.

Table 4.8: Demographic factors and employees exposure to work-related illness

Demographic factors		Employees who faced occupational illness at least once			COR:95%CI	
		Yes	No	Total		
Gender	Male	91	39	130	1.307(0.720-2.370)	
	Female	50	28	78	1.00	
Age	Less than 20yrs	6	1	7	1.00	1.00
	20-29 years	28	31	59	1.00	
	30-39 years	39	14	53	1.00	2.623(1.203-5.714)*
	40-49 years	33	15	48	1.00	2.070(0.950-4.504)
	50-55 years	30	5	35	3.355(1.335-8.403)*	5.494(2.037-14.705)*
	Above 56 Yrs.	5	1	6		
Service Time In tannery	1-5 years(≤5 years)	30	29	59	1.00	1.00
	6-10 years	25	19	44	1.00	1.272(0.580-2.785)
	11-15 years	19	1	20	1.00	18.518(2.309-142.857)*
	Above 15 years	67	18	85	2.463(1.308-4.651)*	3.597(1.736-7.462)*
Educational Level	Primary (1-8)	27	13	40	1.00	1.00
	High school(9-12)	81	25	106	2.267(1.248-4.115)*	1.560(0.701-3.472)
	Certificate and diploma	25	14	39	1.00	0.859(0.339-2.178)
	BSc/BA Degree	6	15	21	1.00	0.257(0.087-0.759)*
	MA/ MSC Degree &	2	0	2	1.00	
Mode of employment	Permanent	114	50	164	1.436(0.719-2.868)	
	Contract/Temporary	27	17	44	1.00	
Unit of work division	Beam house	39	9	48	2.463(1.114-5.434)*	1.00
	Tanning	14	5	19	1.00	0.645(0.184-2.262)
	Post tanning	26	17	43	1.00	3.353(0.137-10.204)
	Finishing and packing	36	17	53	1.00	0.488(0.193-1.234)
	Maintenance	11	9	20	1.00	0.282(0.090-0.883)*
	Raw hide & skin store	8	2	10	1.00	0.923(0.167-5.102)
	Quality laboratory &	7	8	15	1.00	0.201(0.058-0.702)*

*Significant associations ($p < 0.05$)

Respondent's service time within the case tanneries is also other demographic factor which has shown significant association with job related illness prevalence. The results of analysis indicated that unlike exposure to occupational accidents respondents with more experience (working above 15 years') were 2.5 times more vulnerable to occupational illness within the

tannery than other groups who have less experience [COR: 2.463, 95%CI(1.308-4.651)]. The results are consistent with the literature that employees working for many years in tanneries are more liable for occupational illness due to their increased exposure for different unhealthy practices such as exposure to dangerous chemicals, biological and psychological hazards (Padma, et, al. 2016).

Dealing with respondents educational level as discussed in the demographic analysis of the study most of the study participants were within high school educational level and employees within this range of educational level were 2.3 times more susceptible to occupational illness than respondents within other educational level[COR: 2.267, 95%CI(1.248-4.115)]. Besides workers with an elementary level education has got injuries nearly 3.89 times more than respondents which acquire higher education (Bachelors and masters) [COR:0.257,95%CI(0.087-0.759)]. The results are coherent with that of (Teklit, 2016;Khurram, 2006), where respondents that have better educational status were found to be more alert on hazardous practices and less vulnerable for illness. This might be considered to those having higher educational level have better awareness in avoiding unhealthy and hazardous practices and hence maintain their wellbeing well than those with less educational level.

Respondents working unit within the tannery is also another demographic factor that has got significant association with workers job related illness coverage. The results of the analysis discovered that employees who have been working in the beam house were 2.5 times more likely vulnerable for job related illness than workers who have been working in other units [COR: 2.463, 95% CI(1.114-5.434)]. Subsequently, employees of the beam house found to be close to 3.5 time more exposed to diseases than employees of the maintenance section [COR: 0.282, 95%CI (0.090-0.883)]. The results are in accordance with the outcomes of Seyoum, (2014) that beam house workers were found to be more affected than other units of the tanneries. This might be due to the fact that the beam house is one of the production units of the tannery that highly contaminated chemicals and wet process were available which make employees exposed for chemical and biological hazards. Besides since it is the beginning of the tanning process raw hides and skins are available for soaking and bathing process via drums which exposed employees for bacterial infections.

4.2.6.4. Behavioral Factors & Prevalence of Employees Occupational Illness

Alike the occupational accidents here also the behavioral factors have shown significant association with employees work-related disease prevalence rate. The findings of the chi square tests of collected data indicated that OSH awareness level, job satisfaction status and PPE usage rate were significantly correlated with industrial illness pervasiveness rate with Pearson (P) values of 0.005, 0.000 and 0.010 correspondingly.

Table 4.9: Behavioral factors and employees exposure to work-related illness

Behavioral factors		Employees who faced occupational illness at least once			COR:95%CI
		Yes	No	Total	
OSH related Knowledge	Yes	49	37	86	1.00
	No	92	30	122	2.314(1.278-4.184*)
Job satisfaction	Yes	51	42	93	1.00
	No	87	24	111	2.985(1.623-5.494*)
Regular Use of PPE	Yes	88	51	139	1.00
	No	46	10	56	2.666(1.239-5.747*)

*Significant associations ($p < 0.05$)

Dealing with extent of association between those behavioral factors and respondents job related illness exposure rate Crude Odds Ratio (COR) analysis was performed and the results were presented on Table 4.9. The findings of the analysis exposed that respondents who have replied that as they have lack of awareness regarding OSH has 2.3 more vulnerable to occupational disease than employees that have knowledge in relation to tannery's OSH practices [COR: 2.314 95% CI (1.278-4.184)]. The discoveries are in agreement with the outcomes of the study by (Karakuzu and Elmal, 2019). Since workers that have better awareness regarding safety and health aspects take better precautions from practices that impair their health and wellbeing hence they might have less exposed to work-related-illness.

In view of other behavioral factor, respondent's job satisfaction level, respondents that are found to be unsatisfied on their occupation were almost 3 times more exposed to occupational sickness than their counter parts who found satisfied on their work [COR: 2.985, 95% CI(0.1623-5.494)]. It seems logical that workers who are dissatisfied in their job are likely to be exposed for depression, sleeping disorder, headaches, dizziness and other psychological and physical illness.

Discoveries of analysis for PPE usage rate vs. occupational illness exposure rate also revealed that respondents that have claimed as they were not used PPE's within their tannery operations were 2.7 times more vulnerable to disease than their counter parts who have been using PPE'S on regular basis [COR: 2.666, 95% CI(1.239-5.747)]. The findings are in line with other studies that prevalence of diseases among tannery employees is very high and extremely associated with lack of proper PPE using (Mahamudul, et al. 2016; Islam et al. 2017; Teklit, 2016). Coherent with the results for occupational injuries, awareness to OSH aspects, regular PPE usage and job satisfaction found to be decisive factors towards employees exposure to injuries and diseases. Hence, the tanneries management should work hard towards ensuring health and safe work environment via improving employee's PPE usage, OSH awareness and satisfying work environment hence maintain their wellbeing and productivity.

4.2.6.5. Environmental Factors & Employees Exposure to job-related diseases

Among the environmental factors considered OSH related trainings obtainability and employees working Hr. shown significant association with respondent's job related illness prevalence, with Pearson (P) value of 0.012 and 0.006. To determine magnitude of correlation binary logistic regression (COR) analysis were performed and results are shown on Table 4.10. The outcomes uncovered that workforces that have not taken OSH trainings were 2.6 times more exposed to job-related sickness than those who has exposure to OSH related trainings with in their tanneries[COR: 2.631, 95% CI(1.342-5.181)]. The outcomes are coherent with the study findings of (Innawu, et al., 2019). The results are in support of the recommendations forwarded by many scholars that provision of OSH related trainings have significance impact on maintaining employee's wellbeing through behavioral change towards unsafe and hazardous work practices.

Table 4.10: Environmental factors and employees exposure to work-related illness

Environmental factors		Employees who faced occupational illness at least once			COR:95%CI
		Yes	No	Total	
Safety & Health Trainings	Yes	23	24	47	1.00
	No	106	42	148	2.631(1.342-5.181)*
Length of working Hrs.	<8hr.	12	6	18	1.00
	8hr.	71	45	116	1.00
	>8hr.	52	12	64	2.659(1.298-5.464)*

*Significant associations ($p < 0.05$)

Considering employees working Hr. within the tannery those respondents who have been working for more than 8 hr. within their tannery were 2.7 times more likely having occupational disease than respondents who have been working for less time [COR: 2.659, 95% CI(1.298-5.464)]. This might be the reason that working long hours within tanneries besides make employees to fill tired expose them for various job-related illness, either spontaneously or in the long run. The findings are also coherent with the testimonial of many researchers on the subject area that there is an association between worker's duration of work exposure in tanning industry with their clinical symptoms and health status (Arunkumar & Rama, 2017; Padma et al., 2016; Gyan et al., 2020).

4.2.7. Effect of Occupational Accidents and Diseases on Employee Productivity

4.2.7.1. *Employees Sick leave, Absenteeism and Hospitalization status due to Work-Related Accidents & Diseases*

As discussed on the literature review part of this study there is a close linkage between OSH and company's productivity. Employees perform well when they are physically and emotionally capable of working, consecutively leads to higher productivity. Healthy workers are more likely to contribute to productivity and innovation. Job-related accidents and absenteeism from place of work causes productivity loss, besides the primary beneficial impact of good OSH practice on productivity is reduced absenteeism (Esther, 2017; Abera & Yeshmebet, 2020). In line with this fact respondents were asked to respond for number of days they have taken sick leave and became absent due to work related injuries and sickness. Accordingly, from the total respondents 107 (51.4%) of them replied that as they have taken sick leaves due to work related accidents and illness with in the last two years (2011-2012 E.C). Accordingly, a total of 733 sick leave days were taken by respondents with an average of 3.7 days, minimum of 1 day and maximum of 30 days due to work-related injuries. In addition among the study participants 87 (41.8%) of them claimed that as they have become absent from work due to job related accidents and illness with in the last two years. Consequently, a total of 503 absent days with mean of 2.5 days, minimum of 1 day and maximum 25 absent days were registered by respondents due to occupational injuries and illness.

Besides respondents were asked for their hospitalization status and 20(9.6%) reacted as they have been hospitalized within the last two years due to injuries related to their job in their

tannery. Consequently, a total of 176 days with an average of 0.89 days, minimum of 1 day and maximum of 18 days were registered as hospitalization days by those study participants who replied as they have been hospitalized. The above analysis findings implicate the case tanneries are highly suffering from higher rates of absenteeism by workers due to work related accidents and illness. It is obvious that the large record of absenteeism directly affects the productivity of the case company. Moreover, question was raised for employees either they have got payments when they are in sick leave periods, consequently the very majority 184(92.9%) of them replied as they have got their salary during sick leave period. Hence, the case company not only suffers from reduction in productivity but also liable to payments for employees that are not productive as well as incur additional overtime cost for staffs that covered the job of their absent colleagues.

4.2.7.2. Employees Perception regarding How occupational Accidents & Diseases influence their Productivity

Respondents were asked regarding their opinion on how work related accidents & diseases affect their productivity. In line with the literature of this study four major options were raised for respondents regarding effect of job-related injuries on their productivity. Accordingly, 88(29.35%) of them opt for frequent absenteeism, 71(23.7%) opt for poor work performance, 67(22.3%) choose for lessen motivation for work and 63(21%) damaging relations. Remaining, 11(3.7%) answered for other options like, frustration, turnover and exposing colleagues to do for extra time which make them tired, hence affect their efficiency (Fig .4.20).

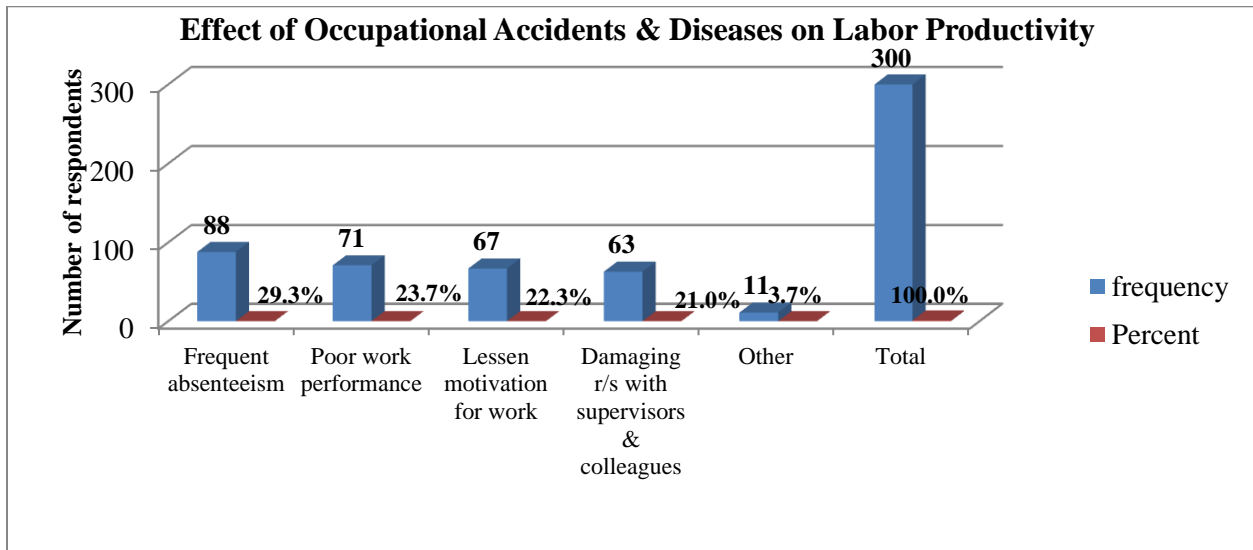


Figure 4.20: Evaluation of occupational accidents and disease on labor productivity

The results are in line with study by (Esther, 2017), the primary beneficial impact of OSH on productivity is reduced absenteeism. As observed on the findings of the questionnaire survey work-related accidents and diseases directly affect labor productivity through frequent absenteeism from work and diminishing their performance. Respondents also reacted as occupational illness and injuries affect their productivity indirectly via lessening motivation for work as well as damaging relationships with their supervisors and colleagues.

It is obvious from the results of the survey that the case company should realize both the direct and indirect effects of work related accidents and diseases towards labor productivity and give due attention for OSH in order to maintain the wellbeing of its workers and hence improve the productivity and profitability of the tanneries.

4.2.8. Major Challenges with regard to Occupational Safety & Health Practices

In order to uncover the major challenges, in addition to the points and limitations discussed in relation OSH practices respondents were asked for the major challenges they have faced with regard to industrial safety and health practices of their tanneries. In view of that as illustrated on Fig .4.21, lack of management commitment 83(25.5%), unavailability of training 67(20.6%), lack of employee awareness 58(17.8%) towards industrial safety and health issues are the major challenges mentioned by participants of the study. The exposed challenges are coherent with previous discussion findings such as, less awareness towards OSH (58.7%), insufficiency of trainings (71.2%), lack of management (66.9%) supporting and triangulating the reality of the limitations with the existing OSH practices of the tanneries. Other respondents also opt for unavailability of PPE's 44(13.5%), absence of employee involvement 33(10.1%) and unavailability of OSH policy 26(8%) as challenges in relation to work-related safety and health practices of their tanneries. The remaining 14(4.3%) respondents choose for other challenges other than mentioned above such as lack of periodic health checkup, less pragmatism towards safety aspects, lack of any enforcing law for safety requirements. The remaining below 30% of participant has other reasons as well as unavailability of adequate safety officers and regular provision of PPE's.

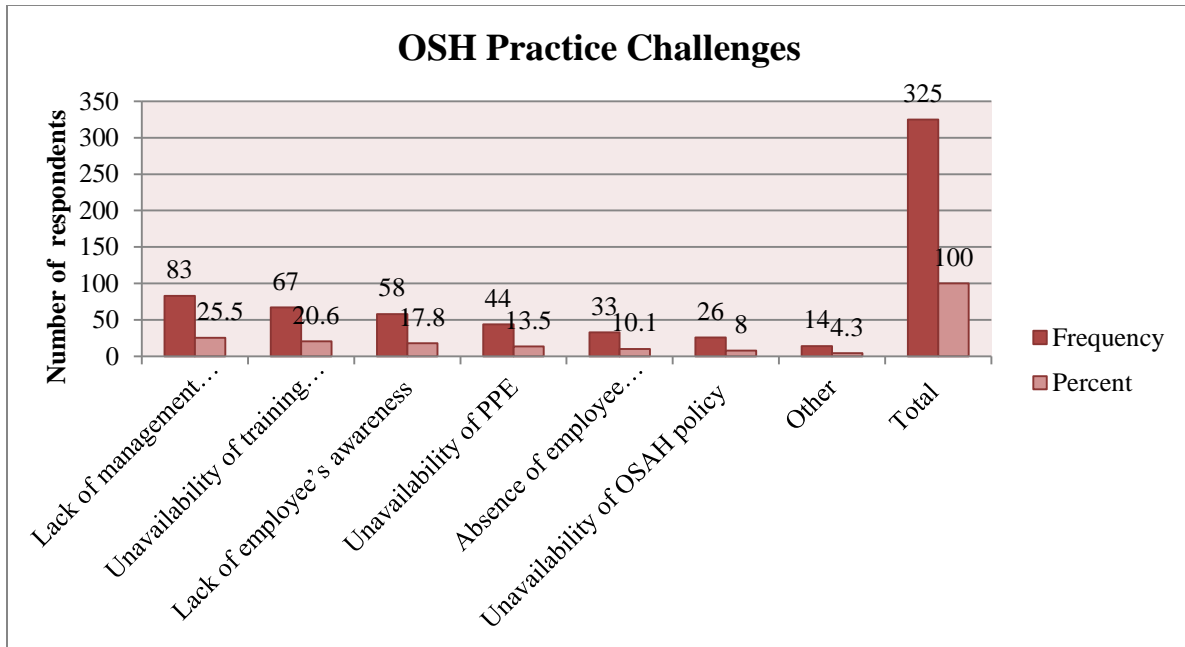


Figure 4.21: Evaluation of major challenges of OSH

Absence of management commitment is taken as the primary and major challenge with regard to the case company's OSH practices. The consecutive challenges, unavailability of trainings and lack of employee's awareness are also interlinked subjects that need critical focus of the management. Hence the top management of the case tanneries should give due attention for the issue and revise its strategy as well as raise the awareness of its employees by offering OJT in relation to OSH. Besides the management should allocate the necessary budget and resource including PPE's, update its OSH policy and communicate to workers through feedback mechanism thereby to implement efficient OSH system across its tanneries.

4.3. Data Analysis of Interview and Company Records

4.3.1. Interview data analysis

Two-sets of structured interviews were prepared as part of data collection. The first one is held with principal informants (department and section managers). Accordingly, from the planned seven interviews, six were conducted with a success rate of 83.3 %. The second part of the interview was conducted with the HSO officer and two physicians of the case tanneries; all the planned three interviews were performed with success rate of 100%. As indicated in Table 4.11; among the planned ten interviews, nine were performed resulting in 90% accomplishment. Since

some of the questions in the interview part were difficult for on-spot response by respondents, it was further investigated by reviewing case company records.

Table 4.11: Tabular representation of interviews

S/No.	Respondent	Date of Interview	Duration/ time
1.	Awash tannery Manger	08/26/20	33 minutes
2.	Abyssinia Tannery manger	08/18/20	31 minutes
3.	Abyssinia Production Manager	09/09/20	27 minutes
4.	Quality Head of case company	08/26//20	32 minutes
5.	Medical doctor of Awash tannery & Case company	09/15/20	41 minutes
6.	Health officer of Abyssinia Tannery	09/09/20	23 minutes
7.	HSO of case company	09/14//20	43 minutes
8.	Head of Raw hide & Chemical store	09/04/20	17 minutes
9.	Technic manager of case company	08/26/20	34 minutes

The major points gathered during the interview were summarized and presented below. The major points gathered during the interview were summarized and presented below.

The interviews held with the administrators of the factory, the production sector, and selected departments of the target population revealed that the company has a written document concerning OSH; however, the interviewees responded that there is a huge gap in its implementation. In addition, the respondents emphasize that even though the policy is available on paper it is not well communicated to employees as well as middle-level management. Moreover, two respondents declared that it is treated under the Environmental management system of the company and is not well addressed as a separate OSH policy.

Regarding the top management commitment, most of the respondents argued that the top management is dedicated to fulfilling OSH practices and allocates an annual budget for the implementation of OSH practices of the company. However, some of the respondents doubt the adequacy of the allocated budget and its effective implementation for its intended purpose. Three interviewees claimed that most of the budget was allocated for the provision of PPE which is supposed to be given for employees on a semi-annual basis, for annual medical checkups, and compensation. In contrast, less concern was given for other aspects of OSH such as training,

awareness programs, and preventive measures. Furthermore, there is a huge gap in monitoring and controlling OSH performance.

The Interview raised questions regarding the periodic provision of training and awareness programs for employees concerning OSH aspects. Most of the responses indicated that even though there were some training seasons given for selected employees in collaboration with interested parties such as Ethiopian Red Cross association, MOLSA and LIDI, there is a huge gap in conducting capacity building programs on OSH issues in a planned and organized manner. All of the participants agreed on the availability of compensation mechanism for employees who sustain injury based on the pre-sated agreement, however the compensation was not enough and not updated. Some respondents claimed that involvement of employees in OSH practices is not significantly observed and this is manifested through some OSH impairing practices such as not lack of using the delivered PPE's, selling of delivered PPE's by few employees, unsafe working culture and poor concern for industrial safety. Minimal involvement of employees indicates the weak periodic evaluation with regard to the performance of OSH practices within the tanneries. Two respondents reported that even though there is a unit responsible for OSH related activities within the case company, some of the OSH monitoring activities are performed informally by Forman's of the production sections. Currently, Abyssinia tannery has no safety officer and the activities are covered by the safety committee and the physician of the case tannery.

Regarding to the effect of OSH on labor productivity, interviewees reflected that work-related accidents and illness has directly affected the productivity and performance of employees by increasing absenteeism and sick leaves and indirectly via demolishing employees' motivation and hence impairing their performance. A question addressing constant evaluation of safety performance was raised and both managers approved that safety permanence is incorporated in annual performance evaluation like production and efficiency performance however, from the total performance evaluation it has got less point (10 %) coverage and it lacks due attention like other job performance measurements. The respondents also revealed that even though there is some effort to work in collaboration with governmental and non-governmental interested parties, there is unsatisfactory result so far.

The second set of interview was conducted with physicians and Safety officer of the case company. The major points from the second set of interview are summarized as follows.

They stated that, respiratory diseases including bronchial asthma, infections, and allergies are some of the illnesses encountered among the employees. Dermatitis is one of the skin diseases that most tannery employees sustain due to exposure to chemical and biological pollutants. Upper respiratory infection is also one of the most common work-related diseases among the case tannery workers. Regarding the causes of diseases the physicians reported that sound pollution, chemical contamination and bacterial infections are the major causes of diseases within the tannery. Raw hides & animal skin within the production section (beam house) has brought bad smell and expose employees for respiratory infections such as common cold and allergies and are major causes of biological hazards.

According to the HSO officer some employees sustained severe injuries and even loss of their body parts especially their hands in operating leather processing machinery. Others also got severe skin injury due to chemical splash over their body. According to the HSO officer, the predisposing factors include outdated leather processing machinery, lack of machinery safety mechanisms, hazardous tanning chemicals, slippery floors, and falling objects.

As explained by the company doctor, the provision of appropriate PPE's is the major mechanism to protect employees from work-related accidents and diseases, particularly the provision of relevant PPE's for specific work units of the tannery instead of generic ones is vital for better OSH performance practice. The participants stated that cloth and gloves are provided in almost all work units. Earplugs are recommended for units that have high sound pollution such as maintenance units, not only the intensity but also the duration of exposure can permanently damage an employee's eardrum. However due to negligence and lack of awareness some employees don't use their PPE's regularly and properly.

The interviewees mentioned that there is a recording and reporting format for work-related injuries but concerning occupational disease, there is only a generic form of recording employee's illness and no separate scheme of recording work-related diseases. Even though some efforts are made for monitoring of accidents there is no organized hazard prone area identification plan and implementation.

As stated by the interviewees and secondary documents especially (the common agreement between the case tanneries vs. workers association) compensation is available for employees who sustained job related injury. According to the interviewees injured employees are referred to three governmental hospitals (St Pauls, Alert & Menelik hospitals) in order to determine the status of injury on body parts after that, compensation payment will be given based on the insurance regulations. Besides the questionnaire survey for employees regarding the number of sick leaves and absent days they took due to work-related disease and accidents, registered sick leaves and absent days by employees of the case tanneries for the last two years due to occupational injuries is presented on company records analysis part. The compensation for employees who sustained work related injury is calculated based on the following formula:-

*Compensation payment= (Basic salary)*12*5*(Percent of damage on body of worker)*

Accordingly, the maximum payment will be 5 years' salary for an employee who sustains complete injury. The physicians reported that some employees claim compensation for work-related injuries where there is no evidence that the precipitating cause is related to their workplace, which makes the decision for compensation payment challenging.

Accordingly, the interviewees held and observation made showed that the challenges of OSH practice in the case tanneries arise from both employee and management side. In addition to the management's weak performance on OSH practices as well as limitations on periodic provision of PPE's, there is also a gap in the employees' side in regard to the effective use of PPE. This is an indication that there is a huge gap in monitoring of OSH performance. Moreover, the medical doctor of the case company revealed that lack of employee awareness and involvement are among the major challenge faced by the tannery with regard to effective OSH practices.

One respondent reported that huge turnover of experienced staffs is another challenge which let new contract employees to take over the job without enough industrial safety exposure which makes them vulnerable to accidents especially while operating the old machineries. Rotation of employees in different work units based on the job demand without safety precautions is another challenge in the OSH practice. Additionally, the work overload and the unmet salary and career promotion leads to disappointment and poor performance outcome. According to the respondents few employees come to work after drinking alcohol predisposing them to accidents.

4.3.2. Analysis of Company Records

In addition to the above analysis of primary data collected through questionnaire survey and structured interview; for secondary data besides literature review, company manuals and other documents in relation to the subject matter under investigation of the case tanneries were reviewed and summarized below. Questions raised in the structured interview part that needs review of company records were also presented.

The following facts in relation to work related accidents and illness were stated on the booklet of common agreement made between employees and case company established in 2013. Accordingly, it was specified that the company has obligation to maintain the right of the employee who has got injury, illness or death in relation to his work and approved by board of physicians in line with the insurance policy of the company. The compensation payment for body parts injured and illness level were labeled and mentioned. Consequently, it was stated that if an employee died or sustained total disability due to work-related accident or illness the company has obliged to make a compensation payment equivalent of the employee's 5 year's salary for his/ her family. Employees who sustained job related accidents and illness have the right to get medication in local medical institutions that would be covered by the company. However, the employee only has got those rights if she/he officially notified the occupational injury encountered within 24hrs for the company. Even though, the case tanneries have both permanent and temporary employees the above rights were declared only for the permanent ones. Based on the observation made, even though some of the contract employees use some of the basic PPE's such as boots and cloth, semi-annual provision of PPE's is given for permanent workers.

It was observed that there is work related accident formats for recording occupational injuries which constitutes, number of accidents, number of injured people, sick leave taken(in days) and payment made(in birr) due to accident, the format is presented in (Appendix D1). The formats are filled by HSO of the company and send to MOLSA on monthly basis. In line with this in 2011 to 2012(E.C), 107 work-related injuries were reported in relation to their work within the tannery. According to the records made on the HSO officer of the company a total of 597 days were recorded as sick leave days due to job related accidents. The mismatch from the questionnaire result is because of the fact that the survey possessed both occupational accident

and illness however the HSO data only hold reported job-related injuries. The other reason is that the mismatch might happen due to poor data recording and reporting culture of the tanneries.

Concerning occupational diseases, the expected data was not collected due to poor data management systems and there was no clinical evidence for whether the illness faced by employees were job related or not except professional observation, employee exposure to ill prone areas and medical history justifications. The data reviewed from the clinic of the case tanneries revealed that only records were available for general illness faced by employees within the period of investigation.

However, from the discussion made with the physicians and review of clinical records major illness that were frequently faced by workers of the case tanneries have been gathered and recorded. The observed occupational illnesses were respiratory tract infections (22%), acute febrile illness(20%), gastroenteritis (16%), dyspepsia(10%), hypertension(8%), back pain(7%), urinary infections(6%) , allergic dermatitis(5%), red-eye(3%) and traumatic injury(3%).

Moreover, a review of data from the finance department of the case company revealed that from 2011 to 2012(E.C) a total of 2,397,597.79.00 birr was incurred as a compensation for case tannery employees within the target population due to work-related injuries.

4.4. Data Analysis of Tanneries Site Observation

In addition to questionnaires distributed and interviews held for gathering primary data direct observation was made on both case tanneries. The direct observation was conducted by developing a structured checklist and shown on (Appendix D) which consists of fifty-four parameters that reveal the state of OSH practice within the case tanneries and filled by the researcher himself. The checklist consists of three parts, the first part deals with general OSH practice observation such as availability of OSH policy, safety regulations and procedures, accident and injury records, first aid kit, firefighting equipment and emergency exit. Besides state of working condition such as temperature, vibration, ventilation noise and heat among the production and other units of the case tanneries were explored.

Accordingly, as indicated on the filled observation checklist even though most of the OSH conditions have shown resemblance among the two sister tanneries small differences were also

observed. Despite the interviewee's argument that the company has industrial safety and health policy, during direct observation it was only possible to observe the procedure manually which is derived from the policy.

The major limitations observed regarding OSH practices were, excessive smell especially around the ETP and beam house areas, lack of ergonomically fit workplace mainly the layout and arrangement of leather processing machinery are not well suited for material and human movement. Besides, unsafe work-in-process inventory of raw hides and skins, highly slippery floors around the production area as well as lack of adequate waste segregation system were among the major impairing practices observed. The facilities around the tanneries such as canteen, cloth exchange room and toilets were not comfortable and not adequate in maintaining the well-being of worker's health. Moreover, some employees working without wearing the necessary PPE's in a way that makes them vulnerable to injury and illness were also observed. Waste management of leather processing bi-products and fleshing are accumulated in a disorganized manner around the effluent treatment area of Awash tannery in which the disturbing smell and contamination expose employees for unnecessary health and safety complications.

The second part of the observation deals with availability and accessibility of appropriate safety precaution signs such as a no-smoking sign, hazard/risk, and noise warning signs, toxic substance sign as well as a fire exit, explosive, corrosive sign and no entry sign to restricted areas. The results of the observation revealed that high risk noise areas, safety information, explosive and corrosive signs haven't been adequately posted with appropriate warning signs. Even though some of the safety related signs were available still they lack accessibility and clarity of observation by employees and other peoples. Hence, all risky areas within the tanneries floor that need warning and safety precaution should be identified labeled and posted on visible areas with clear signs written in both local and foreign languages.

The last section of the observation checklist covers the safety status of the various leather processing equipment's including machinery around production, ETP, maintenance, utility and Laboratory. The surveillance discovered that most of the leather processing machineries are obsolete that their safety barrier guards were not actively functioning. Besides due to the

dysfunction of dust extractors of some of the tanning machinery air-borne contaminants spilled over the production area and safety tags were not visible on most of the tanning machinery. The surveillance revealed that both case tanneries were equipped with secondary treatment plants, however the chrome recovery area needs more protection since unsafe contamination with the surrounding fluid is highly hazardous.

CHAPTER FIVE

5. IDENTIFIED PROBLEMS AND IMPROVEMENT STRATEGIES

5.1. Introduction

In order to develop an effective tailor-made OSH strategy in-depth investigation of the existing practice and analyzing it in line with the theoretical frame work is the first step. Summarizing and identifying the major limitations, work-related injuries and illness, key causes of injuries and illness, associated factors, impairing practices and challenges faced in relation to OSH practices is the second step. The last step which is development of OSH strategy tailored to the case tanneries based on the identified gaps and practices is a crucial step to reduce work-related injuries, illness and therefore to maintain the safety and health of employees. Therefore, through sustaining the well-being of employees would also be possible to improve their productivity, reduce associated costs and increase performance of the case tanneries. Accordingly, this part of the study deals with summary of the major problems identified, impairing practices and challenges in relation to OSH practice within the case tanneries and development of an improvement strategy based on the findings of the study.

5.2. Identified problems

Prior to forwarding remedial measures, summary and identification of major problems and gaps influencing the successful realization of OSH practices within case tanneries is crucial for development of OSH improvement strategies. Owing to its inherent nature and production process the tanning industry is one of the hazardous industries with higher rates of work-related illness and accidents that left the health and safety of employees at risk. The findings of the study also exposed the case tanneries are suffered from various OSH impairing practices as well as job-related injuries and illness, 65.4% and 67.8% of study participants claimed as they became injured and ill respectively at least once in relation to their tannery work within the study period.

The tanning sector due to nature of its production process exposed employees for various forms of physical, chemical and biological hazards. Among the case tanneries OSH problems analyzed and identified lack of awareness to OSH; less satisfaction to assigned job; impracticality of OSH policy and insufficiency of communication to employees; weak OSH related trainings provision

and employee involvement; lack of management commitment and concern; as well as weak safety supervision and adherence to safety regulations; obsolete tanning machineries; unsuitability and irregular provision of PPE's are the major drawbacks. Findings of direct observation also revealed, lack of effective hazard prone areas identification and prevention system; poor data recording and reporting for work related diseases; improper work-in-process inventory of raw hides and skins, poor waste management and clogged drainages; uncomfortable working conditions and facilities such as less quality toilet and canteen, bad smell, heavy noise, poor ventilation, and layout; inadequacy of safety signs and information, as well as risky poor ergonomic ETP and production areas including Beam house operations.

Considering main job-related injuries and illness, cut, abrasion, falling, eye injury, wound and suffocation were the major accidents, while backache, headache, respiratory diseases, skin complications, dizziness, asthma, muscle related problems and allergy were the major health problems which employees of the case tanneries suffered from. The findings indicated that hands, fingers, backbone, leg, toe and knee were identified as most commonly affected body parts of workers due to job-related injuries. Analyzing the causes behind those injuries and illness, bad smell, airborne contaminants, hazardous chemicals, working for long hours working in standing & sitting, lack of ventilation, tedious job and raw hides & skins were among the major observed attributable causes of occupational illness. Whereas, wet and slippery floors, poor work place layout, lifting heavy objects, unsafe tanning machineries, improper manual handling, toxic chemical contact, and dust were major disposing factors identified for job-related injuries.

Summarizing the factors that have shown significant association with occupational injuries and illness, gender, educational level, working experience, monthly income, working unit of respondents has shown significant association with occupational injuries exposure. While, age, educational level, service time and working unit of respondents has shown significant association with job-related illness exposure. Accordingly, female workers were 2.4 times more likely to be injured than their male counter parts [COR: 2.369, 95%CI (1.259-4.464)]. Respondents who have been working for more than 15 years have almost half less exposure to accidents than respondents within less experience groups [COR: 0.516, 95%CI(0.288-0.992)], this is might be highly experienced workers have awareness and ability to identify hazardous areas as well as

avoid risky way of doing things than the less practiced ones. Unlike exposure to industrial accidents respondents with more experience (working above 15 years') were 2.5 times more vulnerable to occupational illness than other groups who have less experience [COR: 2.463, 95%CI(1.308-4.651)]. This is might be due to their increased coverage for unhealthy practices such as exposure to dangerous chemicals, biological and psychological hazards. Workers that acquire only elementary education have been exposed to occupational injuries 4.7 times more than employees within higher educational level groups [COR: 4.651, 95%CI(1.730-12.5)], recognizable that workers with lower educational level have less awareness to industrial safety issues hence much vulnerable to injuries with in the tanneries.

Participants with less monthly income found to be more vulnerable to injuries than respondents with higher salaries. Consequently, respondents who have got a monthly salary of 3000 birr and below were close to 9.9(1/0.101) and 3.17(1/0.315) times more exposed to accidents than those within a salary range of above 5000 birr/month [COR: 0.101, 95% CI(0.040-0.255)], and respondents within a salary range of (3001-5000) birr/month respectively[COR: 0.315, 95% CI(0.155-0.642)], refer Table 4.4.

Dealing with work-related illness participants who were above 50 years of age found to be nearly 3.4 times more exposed to industrial illness than those respondents within less age groups [COR: 3.355, 95%CI(1.335-8.403)]. Unlike exposure to job-related accidents respondents with more experience (working above 15 years) were 2.5 times more vulnerable to occupational illness than other groups who have less experience [COR: 2.463, 95%CI(1.308-4.651)]. Most of the study participants are within secondary education level and workers in this group were 2.3 times more susceptible to occupational illness than respondents within other educational level [COR: 2.267, 95%CI (1.248-4.115)]. Considering tannery's working unit employees who have been working within the beam house of the case tanneries have 2.4 and 2.5 times more exposed to injuries and sickness respectively than respondents who have been working in other units of the tannery [COR: 2.403, 95% CI (1.117-5.181)] and [COR: 2.463, 95% CI (1.114-5.434)], this is might be due to the fact that beam house operations are consisted of hazardous and wet process including tedious drum and fleshing operations which consist of contaminated chemicals that highly exposed employees to injuries, chemical exposure and biological hazard. Besides, raw hides and skins bare employees for bacterial infections refer Table 4.8.

In view of behavioral factors, OSH awareness level, job satisfaction status and PPE usage rate were significantly associated with both job-related accidents and diseases. Respondents who lack awareness regarding OSH were nearly 2.7 and 2.3 times more vulnerable to occupational accidents and illness correspondingly than respondents who have OSH practices knowledge [COR: 2.673 95% CI(1.485-4.807)] & [COR: 2.314 95% CI (1.278-4.184)]. Participants who were unsatisfied on their tannery job were almost 2.6 and 3.0 times more exposed to accidents and diseases consecutively than their complements who were satisfied on their work [COR: 2.551, 95% CI (1.410-4.608)]& [COR: 2.985, 95% CI(1.623-5.494)]. Besides, participants who were not used PPE"s regularly were almost 2.3 times more unprotected to injuries and 2.7 times more vulnerable to disease than their counterparts [COR:2.298, 95% CI(1.135-4.651)] & [COR: 2.666, 95% CI(1.239-5.747)] refer Table 4.5 & 4.9.

Among the environmental factors, employees of the tanneries that have not taken OSH trainings were 2.3 and 2.6 times more likely to have occupational injuries and sickness than those who haven't taken.[COR:2.341, 95% CI(1.193-4.587)] and [COR: 2.631, 95% CI(1.342-5.181)] consecutively. Respondents who have been working for more than 8 hr. within their tannery were 2.7 times more likely having occupational disease than respondents who have been working for less time [COR: 2.659, 95% CI(1.2985.464)] refer (Table 4.6 & 4.10).

The primary beneficial impact of OSH on productivity is reduced absenteeism accordingly, the case company has suffered a lot from higher rates of absenteeism and sick leaves that impair its labor productivity as well as incur costs due to compensation, medication and overtime. Within the last two years (2011-2012 E.C), a total of 733, 503 and 176 sick leaves, absent and hospitalization days respectively were reported by respondents due to occupational injuries and illness.

To halt or minimize the identified main causes of accidents and illness, hence to reduce workers exposure to injuries determining the root causes is vital; in this aspect root cause analysis for occupational injuries of the case tanneries were conducted via fish bone diagram. As illustrated on Fig. 5.1.every core factor has sub causes donating to the major factors of work-related injuries.

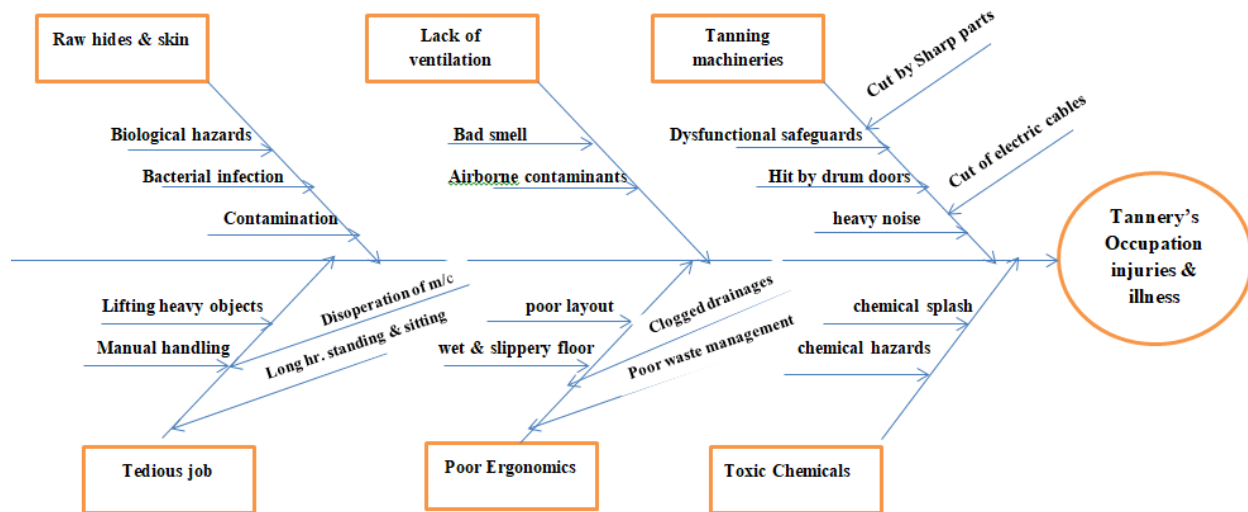


Figure 5.1: Ishikawa diagram for work-related injuries and illness

5.3. Improvement strategy

The results of the study give a clear indication of the effect of the tanneries condition on the safety and health status of employees and oblige the necessity of taking adequate measures to improve the practices and thereby the wellbeing and productivity of employees. Effective implementation of OSH Systems warrants the safety of workers and safeguards their wellbeing and has a significant role in improving their productivity as well as organizational efficiency. According to WHO (2018), improved and harmless workplaces can avoid at least 1.2 million fatalities every year hence promoting good OSH practices might be costly and has an effect on production cost but, decent workplace; skilled, safe and healthy employees are gainful in the long run.

Therefore based on the findings as well as major problems, challenges and impairing practices identified the following areas of intervention are forwarded. Employee training, awareness and involvement; OSH policy communication and management commitment; job-related injury, illness and associated absenteeism; hazard prone areas identification and prevention; work-related illness record system; safety supervision and provision of job specific PPE's as well as maintenance of safe working environment; tannery machineries and equipment's safety; safety measures, signs and ergonomics are major identified OSH intervention areas which need improvement. The achievement of any intervention depends on putting into practice rather than on the intervention's own content (Herrera,et al., 2017). As any other system the improvement

approaches for OSH practices rely on the context, industry nature, safety climate, existing challenges and practices. In practical terms there is no “one-size-fits-all” OSH improvement method and every organization should adapt its own strategy consistent with its own settings.

In line with identified areas of intervention, integrating the OSHMS elements specified under OHSAS 18000 HSE (2013), with Deming’s Plan-Do-Check-Act (P-D-C-A) cycle applied within a safety management system (Marcia, 2016) and best practices for OSHA, (2016) an OSH framework is deployed here as a continual improvement approach through customizing to the case tanneries existing practice (Fig. 5.2).

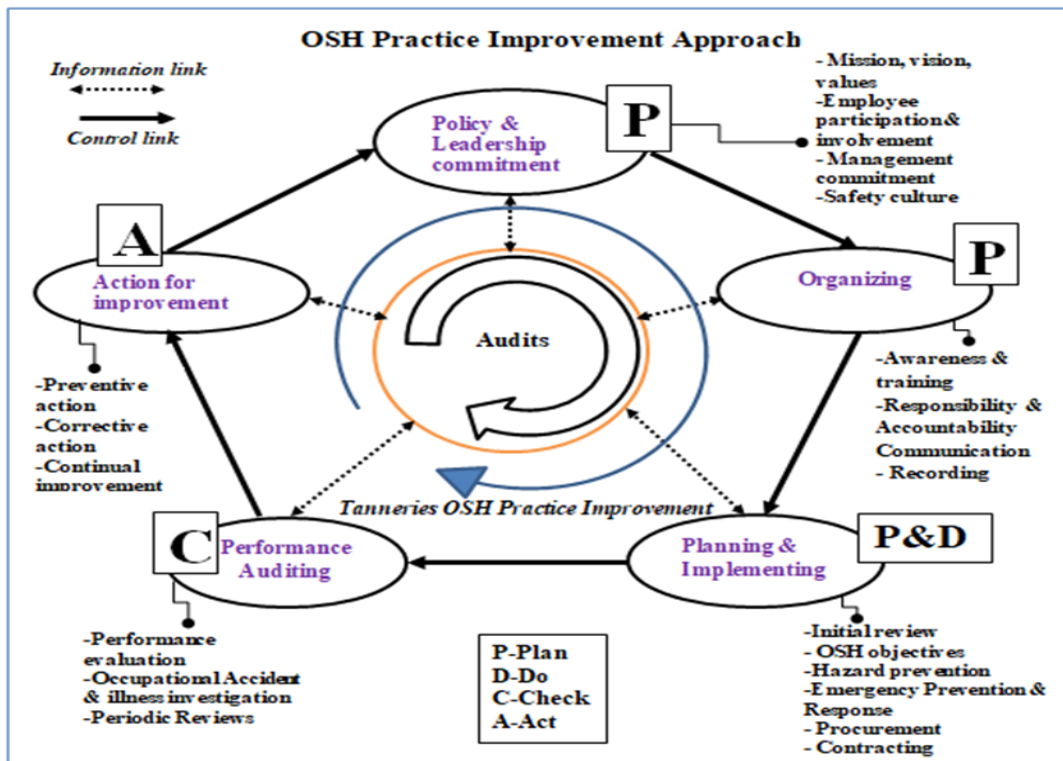


Figure 5.2: OSH Integrated Continual Improvement Framework

- The framework possesses the five core elements of management approach within the P-D-C-A cycle by accommodating OSH,(2016) recommended best practices for organizations.
- Management leadership, workers participation, hazard identification and assessment, hazard prevention and control, education and training, program evaluation and improvement, and communication and coordination for host employers and staffing agencies are recommended best practices by (OSHA, 2016)

- The five core elements of the management approach are labeled with purple at each corner of the frame work. There sub components are also mentioned under each core element.
- The dotted arrows indicate the necessity for open two way information exchange with each stage and the review process as well as the need for corrective and preventive action throughout the cycle.
- The blue curved arrow indicate the ongoing cycle of the 5 stages of the OSH program within the P-D-C-A cycle
- The black curved arrow indicates the need for continuous audit at every step as well as update based on the performance of the progress, thereby maintaining continual improvement of the overall OSH practice

Accordingly, the core components for the proposed integrated OSH continual improvement approach are discussed as below.

5.3.1. Policy and Leadership Commitment (Plan Phase)

A. OSH policy

The company, in consultation with all employees and stakeholders such as byers, supplier's governmental institutions such as LIDI, MOLSA and NGO's like UNIDO and COMESA should set out a written OSH policy and ensure its communication to all workers of the case tanneries. The policy need to demonstrate the management's commitment towards the tanneries OSH practices and assure maintenance of employee's wellbeing.

- Comprise overall required budget, resources, structure & personnel, emergency plans, required activities, performance measurement , audits, status review, and corrective actions.
- Ensure workers participation and involvement in all stages of the program
- Comprise both the permanent and contractual/ temporary workers

B. Leadership Commitment

The company's top management should demonstrate its commitment towards tanneries OSH practice via setting an outline, puts into practice and continuously reviewing its policy. The management should allocate necessary personnel, finance, responsibility and resources to:-

- Ensure periodic provision of PPE's and health checkup to all employees

- Realize regular provision of trainings and awareness programs
- Recruit necessary safety & health personnel such as safety officers and physicians

Moreover, the management needs to develop an organizational structure to establish responsibility and accountability; designating a senior management representative accountable for supervising the tanneries OSH performance and establish effective safety committee to support the tanneries OSH activities

C. Worker participation and Involvement

The company need to confirm all workers are informed and trained on all aspects of OSH including emergency provisions associated with their work. The required budget and resources which enable workers to actively involve on the company's OSH programs have to be available.

To achieve participation of all workers on OSH practice the tanneries need to:-

- Acknowledge model employees and management members who actively participate on OSH programs as equally as other performance rewarding methods.
- Confirm female employees are empowered to participate on OSH initiatives as equally as their male counterparts

5.3.2. Organization Development (Plan Phase)

A. Responsibility & Accountability

The company should develop a structure which establishes responsibility, accountability and authority for the development, operation and performance of the OSH practices of the tanneries and ensure its effectiveness in attaining the pre-settled objectives. The role of management, supervisors and employees should be clearly defined, set accountability and communicated to all parties.

The role employees shall incorporate:

- Obedience to OSH procedures including proper usage of all provided PPEs
- Understanding and practicing of safety signs and precautions in & around the tannery
- Distinguish emergency measures, the place for the first aid kit and fire extinguishers; safe operation of leather processing machineries and equipment's
- Reporting of observed hazards, accident prone areas and impairing practices to concerning body such as safety officer, safety committee or management body.

Likewise, In advance of introducing major organizational changes; new machineries and materials; operations and process as well as the resulting manpower change evaluate the prearranged changes for potential hazards, related risks and outcomes.

B. Awareness & Training Programs

Training and awareness programs should be provided on pre- scheduled and periodic manner for managers, supervisors as well as permanent, contractual and new workers. Both general and job specific safety trainings tailored to the different tannery units should be provided with practical demonstrations through professionals of the field. The trainings shall:

- Consider tannery's safe work practices, proper usage of PPE's & firefighting equipment's, first aid, workplace improvement approaches, unsafe and impairing practices, accident prevention and investigation.
- Give special attention for employees around production, laboratory, maintenance, ETP, raw hide and skin and chemical store and comprise hazard prevention, emergency response, and first aid and job specific safety trainings.
- Be job specific and designed by specialists on the particular job and in collaboration with external stakeholders such as MOLSA, Red Cross Society etc.

An interactive approach of trainings via experience sharing is advisable. Besides formal trainings, the company should develop and disseminate brochures and magazines to enhance employee's awareness on safety and health issue.

C. Recording and Documentation

The company should embrace a strategic and systematic method towards OSH practices documentation including organizing and updating of policy and procedures in a continual manner. The documentation need to possess objectives, resources, staffs, emergency plans, organizational activities, performance measurement, audits, status review, and corrective measures. The developed documents should be delivered to both management and employee in line with their respective duties and responsibilities to tanneries OSH practices. Recording and documentation shall include:

- Annual, semiannual, quarterly and monthly OSH performance reports; records taken at OSH committee meetings, safety and health procedures and manuals; hazard reporting, accident investigation and incident formats;

- Special format for work related illness investigation as well as hazard analysis and emergency response plan; employee participation and associated incentive mechanisms
- Safety history of individuals, machineries and work units; Tanning and other machineries, manuals safe operation tags and measures to be taken during accidents; Safe operation of production, maintenance, ETP, laboratory and other hazardous areas

D. Information and Communication

Companywide communication platform should be established both for internal and external collaboration related to OSH. The ongoing communication ensures full employee participation and involvement. The OSH practice communication should promote:

- The company's and management's commitment towards wellbeing of workers and building safety culture as well as active participation of all workers
- An ongoing and open communication through feedback system, receiving, recording and responding both to internal and external coordination
- Formal and informal communication channels for getting OSH information to employees such as emails, letters, bulletin boards, periodic reports, focus group discussions and get-togethers.

Moreover, technology based communication system are advisable to foster both internal and external communications thereby addressing and keep employees alert to tannery's OSH aspects

5.3.3. Planning and Implementation (*Plan and Do Phase*)

In order to build efficient OSH programs the company should start with a clear and detailed plan. The plan must embrace all-inclusive solutions, cooperation, and involvement by all levels of employees and management. The planning and implementation process have to be in line with national and organizational policies and have to ensure continuous improvement.

A. Baseline Review

The company's existing OSH practice, policy and procedures should be assessed via preliminary review. The preliminary review serves as a baseline for improving the case tanneries OSH practice of by indicating key intervention areas of improvement.

B. Setting Objectives

The company should set specific goals which clearly indicate the intentions and set accountability to get the best output from the planning process. The objectives better to be SMART mean Specific, Measurable, Achievable, Relevant, and Time-specific. The OSH program smart objectives need to:

- Indicate the specific changes to be made, recognize measures that tangibly check progress towards the change and set a realistic outcome based on the schedule
- Specify target work units the initiative covers at first, for instance production, maintenance and ETP areas with high rates of injuries and sickness; prove significance of the goals both for the company and employees involved as well as fix a deadline to measure the steted objectives

C. Identify necessary resources

Properly design and plan for the required financial, material, manpower and other resources necessary for the tanneries effective OSH implementation. Besides capital needed for employee training and employment as well as changes in the physical environment of the tanneries should also be considered. For effective implementation of the developed OSH initiative the company should establish a well-developed action plan which serves as a guide by tracking the progress and indicate areas of intervention.

D. Management of Change

The company should always be ready for managing changes in the process of OSH initiative that would happen due to factors arise from both within and outside the tanneries. The internal change management is necessary for new organizational structure such as, new safety and health section/department, new process and procedures including the resulting new employment. Besides, external changes might occur due to change in national regulations and policy, technology breakthroughs, new labor and safety proclamations and directives as well as change of stakeholders on the issue.

Hence the company should assess the change and take corrective and preventive action in line with the alterations made.

E. Accident Prevention and Control

The company has to be committed in safeguarding employees from injuries and illness that shall arise from any impairing and unsafe practices; support in avoiding or minimalizing injuries and illnesses; reduce or remove safety and health risks; and provide workers safe and healthful working conditions. To prevent and control accidents within the tanneries the company should:

- Assess the efficiency of existing prevention and control plan hence to continue or to adopt another control strategy.
- Identify, prioritize and evaluate alternatives for controlling hazards; develop a hazard control plan and implement it consistent with the plan
- Involve employees who have better experience on handling hazardous situations in accident prevention and control initiatives.

Accident prevention and control ought to comprise both emergency & routine activity hazard control measures in the control plan. Adopt engineering methods, followed by safe work practices, organizational controls, and PPE utilization in a hierarchical manner to prevent hazards within the tannery. Besides, adoption of technologies in hazard prevention process is advisable and update along with its effectiveness

F. Hazard Prevention, Readiness and Response

To identify the potential hazards, potential emergency states and address associated risks of safety and health formation of emergency prevention, preparedness and response is essential element for tanneries OSH practices. Hence would be possible to eliminate or minimalize the devastating effects on the safety and wellbeing of workers, equipment as well as company's image and productivity. The hazard, prevention, preparedness and response plan should:

- Collect, organize, and review existing information regarding the tanneries' hazards including, records of earlier injuries and diseases; employees' compensation payment records and reports; data for frequently occurring injuries and illnesses; tannery's hygiene surveys, and medical records as well as labor unions, OSH committee meeting reports, OSH consultants.
- Check the tannery environment for safety hazards by considering, regular checkup of all operations, machineries, and work areas including production, ETP, raw hide and skin store, chemical store and other hazardous facilities; participating workers through their representatives on the inspection team; maintaining inspections through hazard history

logs to validate the risky conditions are rectified as well as comprise both permanent and temporary workers, contractors, subcontractors, and temporary employees in hazard control programs.

- Consider changing operations, workstations, or workflow; making major organizational changes; or introducing new equipment, materials, or processes, seek the input of workers and evaluate the planned changes for potential hazards and related risks.

Due to lack of instant noticeability nature the investigation of health hazards is more difficult than safety hazards, hence the company should identify the following health hazards associated with tannery exposures and develop mitigation plan for:

- Chemical health hazards resulting from various tanning chemicals, solvents, adhesives, and toxic pollutants/dusts from leather processing process such as buffing; physical health hazards may happen due to excessive noise, radiation and heat exposure; biological health hazard may occur due raw hide and skin, contamination with bacteria's and blood which lead to various infectious disease, allergy and asthma
- Ergonomic health risk factors such as heavy lifting, repetitive motions, vibration, falling which lead to back pain, muscular disorders and other health disorders ;physiological health hazards such working long hours, night shift, which lead to stress, sleeping disorders as well as depression
- Review of employees' medical records and identifying health hazards through clinical findings

In addition, the company should perform in-depth incident investigation based on root cause analysis; identify hazards associated with emergency situations within the tannery workplace; distinguish nature of hazards, establish control measures, and prioritize hazards for control; implement the hazard prevention and control through continuous information exchange and update in line with the existing conditions.

G. Procurement and Contracting

The company has to establish the right procedures and arrangements regarding the acquisition and purchase of resources, machineries, spare parts and services for tanneries operation to prevent or minimize their damaging effects. Besides, tools and equipment's should be checked for their specification requirements and compatibility with safety and health practices as well as effect on environment. Since the tanning industry is exposed for various toxic chemicals

including chrome, waste disposal and management system operations have to be in conformity with safety, health and environmental protection requirements. Consequently the tanneries management should

- Ensure the purchase, removal and recycle of leather processing wastes, consumable and non-consumable materials as well as chemicals in accordance with local and international buyers and suppliers requirements.
- Provide contractors and sub-contractors information regarding about work-related accidents, illnesses and hazards of their employees as well as any hazardous practices and investigations they performed in regular basis for the company.

5.3.4. Performance Evaluation (*Check Phase*)

A. Monitor performance and progress

The company should establish a system for monitoring and evaluating the OSH practice performance in a regular and periodic manner that all concerned management members and officials' involve with clearly mentioned accountability and responsibility and well communicated to all employees. The OSH performance evaluation should define and set clear and measurable performance indicators that will track the progress by adopting

- Lagging performance indicators such as number of injured and ill workers, frequency and severity of injury and sickness, frequency of absenteeism and sick leaves taken due to occupational accidents and illness, as well as compensations made.
- leading indicators such as extent of employee participation in the initiative, Inspection surveys performed and duration taken to reply to reports, audits, corrective measures succeeded and number and frequency of trainings given to employees and associated change of behavior towards OSH aspects.

Importantly, top management, line managers, supervisors, and workers need to actively participate and follow procedures to collect, analyze, and appraise the relevant data on OSH performance indicators and assess the progress and communicate the results to both the management and staff of the tanneries.

B. Verify the practicality and functionality of the platform

The effectiveness of the OSH practice should be verified whether it is working as intended and achieve its targets. The conformity depends on the ability of the program in preventing; minimizing and controlling work-related accidents, illness, and controlling identified hazards and hence maintains wellbeing of the tannery employees and achieving its pre-settled goals. The verification of the OSH practice should:

- Be performed annually or semiannual basis depending on the plan and involve employees in every step and process of the evaluation
- Ensure every step of the process are going well and effective; detect opportunities to improve the existing practice as well as identify progress or failure records should be documented

5.3.5. Action for Improvement (*Act Phase*)

A. Measures to be taken

The company should continuously check whether the OSH practices are performing in line with their intended purpose and maintain the wellbeing of the tanneries employees. If the performance indicators have shown any inconsistency or problem it is necessary to take both corrective and preventive actions to effectively improve the tanneries safety and health practice. Timely accomplishment of corrective actions after hazard identified within the tannery is essential, besides preventive actions should be implemented and monitored based on their pre-established time plan.

B. Continual Improvement

As any other process which adopts continual improvement system for their sustainability, OSH practice need also to comprise those key principles in its process. Hence to achieve the desired result the company's OSH practice should constitute the following key elements which lead to an ongoing overall improvement of the tanneries OSH initiative.

- *Management commitment through core values*, such as development and implementation of a comprehensive OSH Policy acknowledged by top management and communicated to all employees of the tannery; *active participation of employees* throughout the program
- *SWOT analysis*, perform Strength-Weakness-Opportunity and Threat analysis

- *Information exchange*, continuous and open information exchange is necessary between every stage of the OSH program as well as its continual improvement; *knowledge transfer*, perform the right things with the right expertise/professional
- *Sustainability*, OSH practices should be integrated into the company's strategic business plan, evaluated and continually improve

As a continual improvement, top management, managers, supervisors and employees of the company/case tanneries should perform in an integrated manner and take a quick remedial measure when the OSH practice face a problem. Thereby, correct the problem and avoid its repetition and maintain the sustainability of the tanneries OSH practice improvement.

At last, , besides the case tanneries, the improvement approach used for policy makers, sector institutions such as LIDI, MOLSA, UNIDO, COMESA as well as other tanneries with minor amendments too.

CHAPTER SIX

6. CONCLUSION & RECOMMENDATION

This Chapter presents over-all conclusions and recommendations of the study, in line with its major findings. The points for extra research are also emphasized at the end of the Chapter.

6.1. Conclusion

Occupational safety and health (OSH) is the science of the expectation, acknowledgment, appraisal and control of hazards emanating from the industry that could impair the health and safety of employees. As part of the manufacturing industry the leather processing industry share many of the work-related injuries and illness that affect the wellbeing of workers besides due to its inherent nature the tanning sector suffered from many OSH impairing practices, chemical, physical and biological hazards. Hence, the study made an in-depth investigation on OSH practices, challenges and finally forwarded an improvement approach by considering ELICO (Awash & Abyssinia tanneries) in a profound and holistic manner. For acquiring the necessary data the study employed both primary and secondary methods of data collection, primary data was mainly collected through in-depth questionnaire, besides for triangulating the gathered facts, structured interview and direct observation on the tanneries floor in line with the basic objective objectives of the study were also performed. For secondary data besides to the company records, manuals and formats that were consulted an in-depth review of OSH studies in Global and Ethiopia tannery industries were explored and evaluated to verify the identified gaps

As portrayed on the analysis section and summarized in the problem identification part of the study, increased job-related injuries (65.4%) and diseases (67.8%) prevalence were severe problems that affected the wellbeing of the workers which in turn affects the tanneries productivity via poor work performance, frequent absenteeism and decreased moral. The work-related injuries and illness also make the company to incur additional charges via raising compensation and medication payments, increased turnover and overtime. The study also identified the major causes for injuries and illness as well as their root causes via fish bone diagram. Based on the findings it can be concluded that OSH practices within Awash & Abyssinia tanneries is not in accordance with what has been defined as organizational OSH “best practices”

Though the case tanneries has limited strengths in some OSH practices such as availability of safety procedure and officer, organized medical center, injuries recording format, compensation mechanism and partial provision of PPE's there are a lot of limitations with effective OSH practice and implementation that arise from both the management and employee side.

The major limitations and challenges observed are lack of awareness to OSH, less satisfaction to assigned job, impracticality of OSH policy and lack of communication to employees; weak OSH related trainings provision and employee involvement; weak adherences to safety regulations. Unsafe and obsolete tanning machineries as well as impairing practices; deficiency of management commitment and concern; uncomfortable working conditions and services; unsuitability of PPE's are major identified drawbacks.

From direct observation made, lack of effective hazard prone areas identification and prevention system; insufficiency of safety officer and structure; nonexistence of data management systems for work related diseases; exclusiveness of OSH rights for contract workers and unavailability of premium insurance packages; poor ergonomics and layout of the production system, heavy noise and bad smell; inadequacy of first aid kits, safety signs and information around risky production and ETP areas were detected. Lose electrical connections; improper work-in-process inventory of raw hides and skins, waste management system and clogged drainages are also observed.

The results of the study give a clear indication of the effect of the tanneries condition on the safety and health status of employees and oblige the necessity of taking adequate measures to improve the practices and facilities and thereby the wellbeing and productivity of employees. Therefore, to improve the OSH practices of the tanneries and maintain wellbeing of their employees as well as to improve their productivity, an improvement strategy was developed in line with the findings and intervention areas identified.

6.2. Recommendation

Based on the major findings of the study and the conclusion reached, the following key recommendations are forwarded to Awash & Abyssinia tanneries in particular and the tanning industry in general as well as other beneficiary stakeholders to endorse effective OSH practices.

- ✓ A written OSH policy in line with the improvement approach forwarded, need to be developed, updated and communicated to all employees including the temporary ones. Moreover, management needs to allocate the necessary budget and resources and monitor their effective utilization in a continual manner. The government also should develop a sector specific OSH policy for tanneries and enforce its practicality.
- ✓ The OSH platform should be incorporated in strategic business plan of the company (ELICO) and take equal consideration as other business aspects. An OSH department with required personnel's should be formed as well as effective OSH committee needs to be established at both tanneries. Training and awareness creation programs towards OSH aspects should be organized regularly. Besides to formal training programs, would be better if the company arranged informal get-togethers, brochures and magazines related to OSH practices.
- ✓ The existing work-related injury recording and reporting system should be revised and advanced to automated system. Effective hazard prone areas identification, prevention and emergency response plan should be developed. Due to lack of their instant noticeability, the clinic of the company should also develop a unique format for monitoring occupational illness and take remedial measures. Provision of PPE's should be job specific and continuously monitored for regular usage by employees. Worker's adherence to PPE usage and other safety and health regulations should be incorporated on performance evaluation system and weighed as equally as other productivity aspects.
- ✓ Most risky environments, such as beam house, ETP, chemical store, raw hide and skin section need special attention to protect workers from any hazardous practices. Facilities such as toilets and canteens need to be made comfortable and hygienic. Female staffs also need special attention that there private rooms need to be personalized. The obsolete machineries need to be replaced by new one and their dysfunctional safety components should be maintained. Besides, employees need to be given enough awareness of the risk and dangers inherent in their work at the tannery.
- ✓ Last but not least, the management should strive hard to continually improve the OSH practices of the tanneries via active participation of employees as well as closely working with governmental and non-governmental bodies. Through continuous monitoring, evaluation and improvement of the OSH practice will be possible to maintain the

wellbeing of employees thereby boosting their productivity and hence profitability of the tanneries.

6.3. Future Research Area

This research has assessed the practice of OSH in Ethiopian tanneries by considering ELICO (Awash & Abyssinia tanneries) as case tanneries and forwarded improvement strategies. Based on the pitfalls of the study further researches can be carried out on the following areas of investigation.

1. Legal considerations of OSH in Ethiopian tannery industries
2. Socio-economic impacts of OSH in Ethiopian leather processing factories
3. Effect of OSH and environmental management systems in developing nation's tannery industries. Since tannery industries are highly pollutant industries especially in developing countries like Ethiopia it is an interesting area of research that need to be explored.

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Appendices

Appendix A

Global Studies in relation to OSH in Tannery Industries, Evaluation of Works and Identified Gaps

Prevalence of Occupational Skin Diseases and its Predisposing Factors in Leather Tanning Workers of Southern India	(Panjakumar, K. et al. (2020)	To investigate occurrence of various skin diseases and predisposing factors in tannery workers were investigated.	A cross sectional study\as performed. Face to face interview with pre-designed questionnaire and health examination was conducted	The pervasiveness of occupational skin disorders were 39% among the study participants. Contact dermatitis (16%), skin infections (16%), eczematous lesions (7%) and nail discoloration (1.75%) were identified.	The study only considered prevalence of Skin diseases among tannery workers and it lacks all other aspects of health as well as safety aspect and other OSH practice parameters.
Work-related Injury and Disability among Tannery Workers of Kanpur, India	Kashyap, (2021)	To estimate the prevalence and risk factors of occupational injury among the tannery workers of Kanpur, India.	A cross-sectional study design was adopted; interview was used; Multivariable analyses were employed	Over one-tenth of the tannery workers (11%) experienced work-related injuries Tannery workers involved in loading and unloading of raw hide were more likely face injuries.	Limited only to assess prevalence of occupational injuries among tannery workers; effect on productivity & predisposing factors both for the safety & health side were not considered. Besides no improvement approach was forwarded
Occupational Health & Safety (OHAS) crisis in tanneries of Bangladesh: Is this the violation of labor rights?	Md. Atiqur Rahman Sarker, 2014	To explores the current health & safety practices at tanneries in Bangladesh.	This study was conducted through Focus Group Discussion (FGD) & Observation method.	Illness among the factory workers & neighborhood residents of tannery is very serious issue, but there is no monitoring & action taken by law enforcements in Bangladesh. Tannery workers are not well-paid & there is no formal wok practice.	Its major limitation is that more emphasis only on the labor right aspect of the tanneries. Major accidents, causes as well as economic impact & productivity aspects are not covered.

Occupational health hazards among the workers in leather tanneries near Chromepet, India	Padma et al., 2016	To assess the morbidity pattern among leather tannery workers	cross-sectional study was employed in R&om & convenient sampling methods were used. Structured questionnaire was used to collect data	Workers who were exposed to chemicals used in dyeing & tanning of leather goods have developed a various skin infection, acute bronchitis, acute gastritis, urinary tract infections. People with longer exposure tend to develop multiple system involvements	The major limitation of this study is that it focuses only on the health aspect of tanneries. Not considered the safety aspect as well as OSH management.
A Study on Occupational Health & Safety Practices in Bangladeshi Leather Industry	(Basak.et al.,2019)	To evaluate working report of Re-Tie Bangladesh, UNIDO & to forward recommendations for policy management in health & safety issues in tannery industries of Bangladeshi	publication write up based on an evaluation of working report of Re-Tie Bangladesh, UNIDO	The cost to promote good working environment & OHAS status has an effect on production cost but good workplace; skilled, safe & Healthy workers are profitable in the long run.	In this research the methodology is based on secondary data i.e. evaluation of working report, Hence it lacks primary data.
Determination of chemical & physical risk factors in leather industry in terms of occupational health and safety	Karakuzu and Elmal, 2019).	To determine the chemical & physical risk factors in leather industry in terms of occupational health and safety	A literature survey on occupational health and safety was conducted, the related laws, regulations and recommendations were examined	The reliability of chemical risk factors is high and that the physical risk factors are medium reliability. The physical risk and chemical risk perceptions of workers in the survey are moderate/high.	The study focuses only on the physical& chemical risk factors and overlooked other factors besides it use literature reviews major data which is based on secondary data

Occupational health risks among the workers employed in leather tanneries at Kanpur, India	Subodh Kumar Rastogi, Amit P&ey & Sachin Tripathi,2008	to investigate the adverse health effects of exposure to basic tanning pigments, organic solvents & other chemicals used in the leather tanning industries at	A cross-sectional study was used. , A r&om sampling method & a control group were also applied.	Significantly higher prevalence of morbidity among the exposed workers in contrast to that observed in the control groups (40.1% vs. 19.6%)	The major limitation of this study is that it focuses only on the health aspect of tanneries by comparing the effect of chemicals on tannery exposed workers vs. the unexposed ones. Not considered the safety aspect, the causes of injury & other OSH aspects.
Health Problems of the Leather Industry Workers	Iti Dubey & Meenu Shrivastava, 2019	To assess the health of leather industry workers	Purposive & r&om sampling was adopted to assess their health hazards. Structured interview schedule was used for data collection & survey was carried out.	Among the respondents 73.33 % of leather processing units, 76.66 % of leather production units & 80 % of combine leather units had no past record of illness.	This paper only deals with the health status of leather industry workers & their behavioral aspect. Other aspects such as occupational injuries, accidents & their associated factors are not considered. Impact of OSH on productivity, performance & management aspects also were not reflected.
Effects of Leather Industry on Health & Recommendations for Improving the Situation in Pakistan	Madiha, et al., (2010)	To fill the gap in comprehensive information & literature on the detrimental effects of the leather industry on human health.	This work is based on a review of literature on the effects of leather industry on adult & pediatric health. A search of peer-reviewed, indexed papers was done using MEDLINE & search engine Google.	research should be conducted about the health hazards in the leather industry in Pakistan as well as globally to gather data that can be translated into effective prevention programs for both adults as well as pediatric populations	A major limitation of this research is, it only considers the health hazards of the leather industry leaving the safety aspect which lacks completeness in addressing the OSH aspect of tanneries.

Occupational Hazards Caused By Leather Processing Unit	Anshu Agarwal (NA)	To study the occupational hazards & problems faced by workers; working in leather processing units of Jaj-mau, Kanpur workers, India.	A descriptive research design was employed. Survey & questionnaire method was used to collect data. R&om sampling technique was also adopted to select sample leather manufacturing units through lottery method.	Detrimental work practices in tanneries without the use of PPE resulted in physical, chemical, ergonomic, biological problems. Major problem faced by workers was irritation & dryness in skin cracks, itching owing to the exposure of chemicals. Shoulder pain comprised of pain, stiffness, pain in h& & elbow due to the activity performed.	As most other researches the major shortcoming of this research it studies only the health side only. However working in tanneries has both health & safety hazards. Hence excluding the safety side make the research lack inclusiveness in addressing the real problems of OSH.
The Effect of Working Place on Worker's Health in a Tannery in Bangladesh	Salauddin & Tawhidur, (2012)	To investigate the causes of workers' health problems integrated with their daily work in the tanning industry, & with their daily life style pattern.	A qualitative research method with reflexive & descriptive way of writing style was followed. FGD & semi-structured data collection methods were employed.	Health of the workers can be affected by the environment, workplace, kinds of work, way of work, society & culture, & personal behaviors & lifestyle. The findings also shown that health problems of workers involve a holistic process, rather than just one factor, & all factors are integrated with the Workers' lives.	As most of the researches this study also deals only with the health aspect by overlooking the safety aspect in tanneries. Moreover the OSH management as well as performance aspects were also not considered!
Health-related disorders on occupational exposure to chromium in a leather tanning factory (Menoufia, Egypt)	Gaafar, et al., (2010)	To study health disorders among workers in a leather tanning industry & its relation with workplace environment in the same factory.	A cross-sectional comparative study was adopted on workers in a leather tanning factory & 304 as control. Biological monitoring of Cr in blood & urine of participants was done. Hematological investigations were applied.	Exposure to high level of Cr is blamed to increase frequency of skin-related & respiratory manifestations, early Spiro metric changes, & abnormal hematological findings.	The study only taken the health aspects of employees working in tanneries the safety aspect of OSH were not considered. Which make the research to lack comprehensiveness

Knowledge on occupational skin disorder among tannery workers	Mary & Saravanan, 2017	To assess knowledge on occupational skin disorder among tannery workers	Cross sectional descriptive design was adopted. R&omized Convenience sampling method was used to take representative sample.	The findings revealed that in knowledge assessment out of 30 samples, 15 members were adequate knowledge & 10 members were moderate knowledge & 5 members were inadequate knowledge.	The major limitation of the study was it considers the health side & specifically knowledge regarding skin diseases among tannery workers. It didn't reflect the causes as well as other health aspects among tannery employees
A Study on Occupational Health & Safety for Tannery workers at Khartoum State	Fadewa, 2017	To assess the level of (OSH) precautions & standards in Khartoum tanneries.	Survey is the main research method of this study. Questionnaire was used as a primary data collection tool. R&om sampling technique was adopted to take representative sample.	OSH practices at Sudan tanneries are not in conformity with what has been described as "best practices". Employees health & safety in Sudan tanneries, is influenced negatively by poor management of safety practices & safety programs, bad Management attitude towards health & safety, & training of employees on safety standards in the organization.	The study mainly focuses on the level of awareness of employees as well as management commitment in Sudan tanneries. Major accidents & diseases magnitude as well as their cause causes were not covered. Moreover impact of OSH on productivity & performance were also overlooked.
Prevalence & determinants of asthma in adult male leather tannery workers in Karachi, Pakistan: A cross sectional study	(Khurram, 2006)	To estimate the prevalence & to identify some risk factors of adult asthma in male leather tannery workers in Karachi, Pakistan.	A cross sectional study was employed. Convenience sampling method was applied.. Face to face interviews were performed using a structured pre-tested questionnaire.	Prevalence of asthma in leather tannery workers appears to be high & is associated with educational status, ethnicity, smoking, glove use, perceived to have allergy & duration of work.	The study is limited in only assessing OSH diseases, specifically prevalence of Asthma among tannery workers. Hence the study lacks other aspects such as safety, causes of injuries as well as effect on productivity.

Occupational health hazards & safety practices among the workers of tannery industry in Bangladesh	Islam et al., 2017.	To determine the prevalence & patterns of health problems of the tannery workers, & to find out the factors associated with those health problems	Cross sectional study was conducted in Hazaribagh, Dhaka, Bangladesh. R&om & purposive sampling was employed. A st&ardized, structured & close ended questionnaire was used.	Working environment, types of work, way of work, smoking, use of PPE & lifestyle has a great impact on the health of the tannery workers. Smoking & household income of the respondents were found significantly associated with the morbidity of the tannery workers.	The research has covered both the health problems as well as associated factors in tannery workers. However here also the safety side as well as the other parameters such as performance and productivity aspects were not considered
Prevalence & determination of occupational diseases of leather tannery workers	Mohanta <i>et al</i> , 2012	To determine prevalence of work related diseases among leather tanning workers	survey was conducted. Open ended questionnaire & interview were used as a method of collecting data from respondents	From the findings, Hazaribagh area tannery workers has been suffering from many health problems including skin disease, gastrointestinal disease, respiratory illnesses, jaundice etc.	As most of the studies this study also reflected major health problems & their factors in tanneries. However the injuries faced by tannery employees due to accidents were not discussed. In addition there impact on performance & productivity were also not evaluated
Prevalence of Health Diseases among Bangladeshi Tannery Workers & associated Risk factors with Workplace Investigation	Mahamudul et al., 2016	To estimate the prevalence of health hazards among tannery workers & to identify risks factors of these diseases in tannery workers in Dhaka, Bangladesh	A cross sectional study was conducted Face to face interview was performed using a questionnaire & skin diseases faced by the workers were identified via trained medical students.	Prevalence of diseases (gastrointestinal problem, Diarrhea, Blood pressure, Asthma, Eye problem & Skin disease such nail discoloration) among the tannery workers are very high & is extremely associated with different working areas of leather processing & the lack of proper PPE.	Comprehensive investigation the various health problems associated with tannery workers & their associated risk factors. However other aspects such as safety aspect , performance, employees level of awareness towards OSH were not discussed

Appendix B

Questionnaires for case tanneries

አዲስ አበባ ዩኒቨርሲቲ

አዲስ አበባ ቴክኖሎጂ ኢንስቲትዩት

መካኒካል እና ኢንዱስትሪያል ምህንድስና ትምህርት ክፍል



የጥናቱ ርዕስ፡- የቆዳ ፋብሪካዎች የስራ ቦታ ደህንነት እና ጤንነት አተገባበር፣ ተግዳሮቶች እና የማሻሻያ ስልቶች (በኢትዮ-ሌዘር ኢንዱስትሪ ኅላፊነቱ የተወሰነ የግል ማህበር ስር በሚገኙት አዋሽ እና አቢሲኒያ ቆዳ ፋብሪካዎች)።

ለወደ የጥናቱ ተሳታፊ፡- የመጠይቁ ዋና አላማ ለትምህርት እና ምርምር ስራ ብቻ ሲሆን የሚሠጡት ምላሽ ምስጢራዊነቱ የተጠበቀ ነው። በመሆኑም የሚሰጡን ገለልተኛና ሚዛናዊ መረጃ ለምርምር ጥናቱ ውጤታማነት እና ታማኝነት ከፍተኛ አስተዋፅኦ ስላለው ጥያቄዎችን በሀቀኝነት እንደሚሞሉልኝ በማመን ወደ ጊዜዎትን ሰጥተዋል። ስለሚሰጡት ከወዲሁ አመሰግናለሁ! በተጨማሪም ጥናቱ ሲጠናቀቅ በምርምር ግኝቱ ላይ ተመርኩዞ የሚሰጡ ምክረ ሃሳቦች እና የመፍትሄ አቅጣጫዎች ጥናቱ ለሚካሄድባቸው ቆዳ ፋብሪካዎችም ሆነ አጠቃላይ ለሀገራችን የቆዳ ኢንዱስትሪ ዘርፍ ግብአት በመሆን የዘርፉን ችግሮች ከመፍታት አኳያ ከፍተኛ አስተዋፅኦ ይኖረዋል ተብሎ ይጠበቃል።

መጠይቁን ለመሙላት የመረጡት ላይ የጭረት ምልክት (✓) ማድረግ ወይም ማክበብ ይችላሉ።

ተጨማሪ መረጃዎችን በስልክ፡+251911182597/በኢ-ሜል fitsum4444@gmail.com ማግኘት ይችላሉ

ከሠላምታ ጋር

ፍፁም አምባቸው

ክፍል አንድ፡ የግል መረጃ

1. የታ፡ ሀ). ወንድ ለ). ሴት
2. ዕድሜ፡ ሀ). ከ20 ዓመት በታች ለ). ከ20-29 ዓመት. ሐ). 30-39 ዓመት. መ). 40-49 ዓመት. ሰ). 50-55ዓመት ረ). ከ56 አመት በላይ
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4. በቆዳ ፋብሪካው ለምን ያህል ጊዜ አገልግለዋል? ሀ). 1-5 ዓመት (5 ዓመት እና በታች) ለ). 6-10 ዓመት ሐ). 11-15 አመት መ). ከ 15 አመት በላይ
5. የስራ ቅጥር ሁኔታ፡ ሀ). ቋሚ ለ). ኮንትራት/ጊዜያዊ ሐ). ሌላ ካለ ይግለጹ_____
6. የሚሰሩበት የስራ ክፍል፡_____
7. አሁን የሚያገኙት ደመወዝ፡_____

ክፍል ሁለት : የሰራተኞች የስራ ቦታ ደህንነትና ጤንነት ባህርያትን በተመለከተ

1. በቆዳ ፋብሪካው ውስጥ የስራ ቦታ ደህንነት እና ጤንነት ግንዛቤ አለዎት? ሀ). አለኝ ለ). የለኝም
2. በስራ ቦታዎ የአደጋ መከላከያ መሳሪያዎችን ይጠቀማሉ? ሀ). አጠቀማለሁ ለ). አልጠቀምም
3. ለጥያቄ ተራ ቁጥር '2' መልስዎ አጠቀማለሁ ከሆነ ከሚከተሉት ውስጥ የትኞቹን የግል አደጋ መከላከያ መሳሪያዎች ይጠቀማሉ? ሀ). የደህንነት ጫማ ለ). የጭንቅላት መሸፈኛ ሐ). የጆሮ መሸፈኛ መ). የእጅ ቅንት ሰ). የአባረት(ብናኝ) መከላከያ ረ). የደህንነት መነጽር ሸ). ሙሉ ልብስ (ቱታ ቀ). የፊት መሸፈኛ በ). ሌላ ካለ ይግለጹ:- _____
4. ለጥያቄ ተራ ቁጥር '3' መልስዎ አልጠቀምም ከሆነ ምክንያቱ ምንድነው? ሀ). የአደጋ መከላከያ መሳሪያዎች አለመኖር ለ). የአደጋ መከላከያ መሳሪያዎች አጠቃቀም ግንዛቤ ማነስ ሐ). መከላከያ መሳሪያዎቹ እርስዎ ለሚሰሩት ስራ የማይመጡ መሆን መ). ግዴታሽነት ሰ). ምቹ አለመሆን ረ). ሌላ ካለ ይጥቀሱ- _____
5. አሁን በሚሰሩበት የስራ መደብ ደስተኝነዎት? ሀ). አዎ ለ). አይደለሁም
6. ለጥያቄ ተራ ቁጥር '5' መልስዎ አይደለሁም ከሆነ ምክንያቱ ምንድነው? _____
7. በስራ ቀናት ውስጥ ከዚህ በታች ከተዘረዘሩት ውስጥ የትኛው/ኞቹ ልምዶች አለብዎት? ሀ). አልኮል መጠጣት ለ). ሲጋራ ማጨስ ሐ). ጫት መቃም መ). ምንም ልምድ የለብኝም ሰ). ሌላ ካለ ይግለጹ:- _____

ክፍል ሶስት: የስራ ቦታ አካባቢ ሁኔታዎች

1. በቆዳ ፋብሪካው ውስጥ በቀን ለምን ያህል ሠዓት ይሠራሉ? ሀ). ከስምንት ሰዓት በታች ለ). ስምንት ሰዓት ሐ). ከስምንት ሰዓት በላይ
2. በሳምንት ምን ያህል ቀናት ከስራዎ ያርፋሉ? ሀ). አንድ ቀን ለ). ሁለት ቀን ሐ). ከሁለት ቀን በላይ መ). ሌላ ካለ ይግለጹ- _____
3. ከስራ ቦታ ደህንነትና ጤና አጠባበቅ ጋር ተዛማጅ የሆኑ ስልጠናዎችን ወስደው ያውቃሉ? ሀ). ወስጃለሁ ለ). አልወሰድኩም መልስዎ ወስጃለሁ ከሆነ በአመት ምን ያህል ስልጠና ወስደዋል? _____
4. በቆዳ ፋብሪካው ውስጥ ለስራ ሚጠቀሙባቸው ማሽኒሮዎች እና መሳሪያዎች ለአደጋ የሚያጋልጥዎ ናቸው? ሀ). አዎ ለ). አይደለም
5. መልስዎ 'አዎ' ከሆነ ምክንያቱ ምንድነው? ሀ). በጣም ያረጁ መሆናቸው ለ). የአደጋ መከላከያ የሌላቸው በመሆኑ ሐ). ተደጋጋሚ ብልሽት መ). የአጠቃቀም እውቀት አለመኖር ሰ). ግዴታሽነት ረ). መደበኛ የቅድመ ብልሽት ጥገና አለመኖር ሸ). ሌላ ካለ ይግለጹ- _____
6. የስራ ደህንነት መመሪያዎችን አተገባበር እና የራስ መከላከያ መሳሪያዎችን አጠቃቀም በተመለከተ በቆዳ ፋብሪካው ውስጥ መደበኛ ክትትል ይደረጋል? ሀ). ይደረጋል ለ). አይደረግም

7. ውጤታማ የሆነ የስራ ቦታ ደህንነት እና ጤንነት አተገባበርን በተመለከተ የቆዳ ፋብሪካውን አመራር ቁርጠኝነት እንዴት ይገመግሙታል? ሀ). በጣም ቁርጠኛ ነው ለ). ቁርጠኛ ነው ሐ). ቁርጠኛ አይደለም መ). በጣም ቁርጠኝነት ያንሰዋል
8. በቆዳ ፋብሪካው ውስጥ ያለውን የስራ ቦታ ሁኔታዎች ግምገማ ከታች ባለው ሰንጠረዥ በተገለፁት የምቹነት ደረጃ ላይ የጭረት (✓) ምልክት በማድረግ ይግለፁ።

ተ.ቁ	የቆዳ ፋብሪካው የስራ ቦታ ሁኔታ	በጣም ምቹ	ምቹ	ምቹ አይደለም	በጣም ምቹ አይደለም
1	የአየር ዝውውር				
2	ብርሀን				
3	የስራ ቦታ አቀማመጥ				
4	ግልጋሎቶች(ሽንት ቤት፣ንፁህ ወሃ እና መመገቢያ ቦታ)				
5	የመጀመርያ እርዳታ እና ክሊኒክ				
6	የራስ መከላከያ መሳርያዎች				
7	ሽታ				
8	ድምጽ				
9	ሙቀት እና ቅዝቃዜ				

ክፍል አራት:- በቆዳ ፋብሪካው ከስራ ጋር ተያያዥነት ያላቸው አደጋዎች እና መንስዔዎቻቸው

1. በቆዳ ፋብሪካው ከስር ከተዘረዘሩት ውስጥ የትኞቹ አደጋዎች በምን ያህል ድግምግሞሽ አጋጥሞት ያውቃል? እባክዎ ከስር ባለው ሰንጠረዥ ላይ የጭረት (✓) ምልክት በማድረግ ይግለፁ።

ተ.ቁ	የአደጋው አይነት	ብዙ ጊዜ	አልፎ አልፎ	በጣም አልፎ አልፎ	አጋጥሞኝ አያውቅም
1	መቆረጥ				
2	መቃጠል				
3	መቁሰል				
4	መላላጥ				
5	መውደቅ				
6	የዓይን ጉዳት				
7	የጆሮ ጉዳት				
8	የአጥንት ስብራት				
9	መስጠም				
10	መታፍን				
11	መወጋት				
12	ውልቃት				
13	ወለምታ				
14	ሌላ ካለ ይግለፁ:-				

2. በስራ ቦታ ላይ ለተከሰቱ አደጋዎች ከስር ከተዘረዘሩት የትኞቹ ሁኔታዎች መንስዔ ሆነዋል?

ተ.ቁ	የስራ ቦታ አደጋ መንስዔዎች	አዎ	አይደለም
1	የቆዳ ማሽነሪዎች እና መሳርያዎች		
2	የመርዛማ ኬሚካሎች ንክኪ		
3	የጋሎ ነገሮች		

4	የኤሌክትሪክ ንዝረት		
5	ከግሎብ አካላት ጋር መጋጨት		
6	ከፍተኛ ሙቀት እና ቅዝቃዜ		
7	ከባድ ነገሮችን ማንሳት		
8	ከላይ የሚወድቁ ቁሳቁሶች		
9	ደካማ ብርሃን መኖር		
10	መደናቀፍ እና ማዳለጥ(እርጥብና አንሸራታች መሪት)		
11	ከፍተኛ ድምፅ		
12	ብናኝ እና አቧራ		
13	ከፍተኛ ርግብጋቤ		
14	ትክክለኛ ያልሆነ የመሳርያ/ቁሶች አይደለም		
15	ምቹ ያልሆነ የሥራ ቦታ፣ ማሽን/ሰራተኛ እና ቁሶች አቀማመጥ/አደረጃጀት		
16	ድግምግምሽ ያለው ስራና እንቅስቃሴ		
17	ሹል አቃወች		
18	ሌላ ካለ ይግለፁ:-		

3. በቆዳ ፋብሪካው ከስራዎ ጋር በተገናኝ የትኛው የሰውነትዎ ክፍል አብዛኛውን ጊዜ ለአደጋ ይጋለጣል?

ተ.ቁ	ጉዳት ያጋጠመው የሰውነት ክፍል	አዎ	አይደለም
1	እጅ		
2	አይን		
3	ጆሮ		
4	ራስ		
5	ጥርስ		
6	የእጅ ጣት		
7	የእግር ጣት		
8	ጉልበት		
9	ክንድ		
10	እግር		
11	የጀርባ አጥንት/አከርካሪ		
12	ደረት		
13	ሌላ ካለ ይግለፁ:-		

ክፍል አምስት:- በቆዳ ፋብሪካው ከስራ ጋር ተያያዥነት ያላቸው በሽታዎች እና መንስዔዎቻቸው

1. በቆዳ ፋብሪካው ከስር ከተዘረዘሩት ውስጥ የትኞቹ በሽታዎች በምን ያህል ድግምግምሽ አጋጥሞት ያውቃል? እባክዎ በሚቀጥለው ገፅ ባለው ሰንጠረዥ ላይ የጭረት ምልክት (✓) በማድረግ ይግለፁ:-

ተ.ቁ	የሀመም ምልክቶች/ አይነቶች	ብዙ ጊዜ	አልፎ አልፎ	በጣም አልፎ አልፎ	አጋጥሞኝ አያውቅም
1	አጣዳፊ የትኩሳት ሀመም				
2	አለርጂ				
3	አንትራክስ/አበባ ሠንጋ				
4	የወገብ ሀመም				
5	አስም				
6	ድብርት				
7	የተቅማጥ ሀመም				
8	ማዞር				
9	እራስ ሀመም				
10	የልብ ሀመም				
11	የጉበት ሀመም				
12	ደም ግፊት				
13	የመገጣጠሚያ እና የጡንቻ ሀመም				
14	ማቅለሽለሽ እና ማስታወክ				
15	የነርቭ ጉዳት				
16	የሳምባ ምች				
17	የመተንፈሻ እና የሳንባ ሀመም				
18	የቆዳ ሀመም				
19	የእንቅልፍ መዛባት				
20	የድምጽ ለውጥ				
21	ሌላ ካለ ይግለጹ:-				

2. ከሚከተሉት ሁኔታዎች በየትኞቹ ምክንያት በቆዳ ፋብሪካው ውስጥ ለሀመም ተዳርገው ያውቃሉ?

ተ.ቁ	የስራ ነክ ሀመም መንስኤዎች	አዎ	አይደለም
1	ብናኝ እና አቧራ		
2	መጥፎ ሽታ		
3	ባዮሎጂካል የሆኑ የበሽታ መንስኤዎች		
4	የአደገኛ ኬሚካሎች ንክኪ		
5	ከፍተኛ ድምፅ/ጫጫታ		
6	ከፍተኛ ሙቀት/ቅዝቃዜ		
7	ከፍተኛ መርገብገብ		
8	የቆዳ ማሽነሪዎች እና መሳርያዎች		
9	ደካማ ብርሃን		
10	ጥሪ ቆዳ እና ሌሎ		
11	ተደጋጋሚ እንቅስቃሴ		
12	በስራ ምክንያት መጨናነቅ		
13	በቂ የአየር ዝውውር አለመኖር		
14	አድካሚ ስራ		
15	በለሊት ፈረቃ መስራት		
16	ለረጅም ጊዜ ቆሞ/ቁጭ ብሎ መስራት		
17	ሌላ ካለ ይግለጹ:-		

Appendix C

A. Interview questions for tannery managers and department managers

1. Is there a written document on occupational safety and health policy within your tannery? If available, how do you rate the success of the OSH policy and its practice?
2. How do you evaluate the commitment of the management with regard to OSH practice?
3. Does your company facilitate trainings and awareness programs for the employees with regard to OSH?
4. How do you evaluate your tannery workers awareness, knowledge & involvement with regard to OSH practices?
5. Do you have any compensation mechanism for employees who sustain injury in their work place?
6. How do work-related accidents and health disasters affect the productivity of your tannery or department? Can you quantify the loss in productivity?
7. Is there continuous valuation in place to evaluate the performance of OSH practices in your tannery?
8. Does your company allocate adequate finance and resource such as PPE's to run occupational safety & health practice?
9. Does your company work in collaborative affiliation with other organizations (Governmental & non-governmental) to promote safe and healthy work environment?
10. What are the main challenges for successful implementation of safety and health programs in your tannery and what do you recommend for overcoming those challenges?

Thank you for your corporation!

B. Interview with OSH Officer, Medical doctor & Health Officer of the company

1. Does the top management allocate adequate budget for health and safety practices?
2. Is there any manual of instruction how to use PPE and first aid tools?
3. Do you perform risk assessment to understand about the risks in your tannery, put sensible measures in place to control them, and make sure they stay controlled? If not what is the reason?
4. How do you rate your tanneries management commitment in ensuring effective work-related safety and health practices?
5. How do you rate your company's employee's awareness and involvement with regard to occupational safety and health practices?
6. Is there a mechanism of recording & reporting work-related injuries on duly basis as well as identification of hazard areas?
7. What are the major work-related accidents and diseases that frequently affect your tannery workers?
8. From your observation & experience, what are the most prominent causes of accidents and diseases in your tannery?
9. What are the main challenges and impairing practices with regard to occupational safety & health practices of your tannery?

10. Does your company have any compensation mechanism for employees who got injured due to their work? If is yes how much compensation does your company pay within the last two years?
11. How many times did your employees take sick leave due to occupational accident and illness within the last two years?
12. How many days were your employees absent from work due to work related accidents and diseases within the last two years?
13. How many employees got hospitalized due to occupational accident and diseases with in the last two years?
14. How much cost did your company incurred due to hospitalization, medication and other occupational injury of your employees with in the last two year
15. In your opinion, how occupational accidents & diseases affect employee's productivity & performance of your tannery?
16. What do you recommend for successful practice and implementation of OSH within your tannery?

Thank you very much for taking time to answer the questions.

Appendix D

Observation Check list

S/No.	Items to be checked	Awsah Tannery		Abyssinia Tannery		Remark (Observation of impairing practices at specific unit)
		Yes	No	Yes	No	
Part I	General observation					
1	Is there OSH board in working units?		✓		✓	
2	Are there safety regulations & procedures in place?	✓		✓		
3	Are there any accident & injury records in place?	✓		✓		
4	Is there any first aid kit with necessary facilities in various units of the tannery?		✓		✓	In some units available and in other units missed
5	Are there any firefighting equipment's?	✓		✓		Not adequate
6	Is there any emergency exit.					
7	Is there good housekeeping/ sanitation implemented in various units of the tannery?		✓	✓		
8	Is there excessive temperature?		✓		✓	
9	Is there excessive noise?	✓		✓		In utilities and compressor section
10	Is there excessive heat?		✓			Only in few units such as boiler room
11	Is there adequate ventilation?		✓		✓	Not adequate
12	Is there ergonomically fit working place?		✓			
13	Is the layout & arrangement of processing facilities adequate for human & material movement?		✓		✓	
14	Is there excessive dust in the work place?		✓		✓	In some work units
15	Is there separate place for storage of fleshing's and chemicals?	✓		✓		
16	Is there safe transfer of chemicals without direct contact of workers?	✓		✓		
17	Are there chemicals & fluids spilled over the surface?	✓		✓		

18	Is there adequate waste segregation?		✓	✓		
19	Are all employees wearing PPE as required? Gloves, Aprons, Face & dust masks etc.		✓		✓	Only limited
20	Is there a clean place to eat and drink?		✓	✓		
21	Is there a person/unit in charge of the health & safety system of the tannery?	✓			✓	
22	Are the production and other unit's floor non-slip?		✓		✓	
23	Is there adequate and well ventilated raw hides & skin store.	✓		✓		
24	Are there clean and adequate cloth exchange room and toilets for men and women?		✓		✓	
PART II	Availability of precaution signs					
25	Are No-smoking sign clearly available in the flammable materials stores		✓		✓	
26	Is there adequate safety information / hazard warning signage?		✓		✓	
27	Have high risks/noise areas been adequately posted with appropriate warning signs?		✓		✓	
28	Toxic substance sign	✓		✓		
29	Fire exit sign	✓		✓		
30	Explosive sign		✓		✓	
31	Corrosive sign		✓		✓	
32	No entry sign to restricted areas except for responsible personnel	✓		✓		
PART III	Machinery & equipment observation (machines for Leather processing, ETP, Maintenance, Utility & Laboratory)					
33	Are machines used modern and have effective safety system such as active barrier guard in place?		✓		✓	
34	Is there safety guidelines tagged on each of the machines?		✓		✓	Only on some machineries
35	Are the control devices & emergency OFF button within reach of the operators and easily distinguishable?		✓			On some of the machineries not clearly observed
36	Is there preventive maintenance schedule?	✓		✓		
37	Fan and fan cover in place?	✓		✓		
38	Is there oil and chemical leakage from machineries?	✓		✓		
39	Are electrical cables protected?	✓		✓		
40	Is there dust extractor in place for (Sam setting, shaving, staking, toggling, buffing & dedusting m/cs?)	✓				
41	Is there mechanical means of material handling?	✓		✓		
42	Are machine covers, blades & other contact parts corroded?	✓		✓		Due to obsolescence some machine parts are corroded
43	Are there primary and secondary ETP's in place?	✓		✓		
44	Are the available chrome recovery units (ETP) functional?		✓	✓		
45	Are tanks guarded?	✓		✓		
46	Is there easy access to reactor and chemical mixing tank?			✓		
48	Is there a separate and convenient maintenance work shop?	✓			✓	

49	Is there a separate room for utilities?	✓		✓		
50	Are the steam & compressed air lines leakage free and insulated?	✓		✓		
51	Is there automatic & adequate power generator in the case of power shutdown?		✓		✓	
52	Does the main electrical panel enclosed to avoid unintentional contacts?	✓	✓			
53	Are standard color codes in place for electrical cables?		✓	✓		

Additional observation with regard to occupational safety & health practice of the tanneries as well as any impairing practices _____

End of observation

Appendix D 2

Company's job related injury recording format

ETHIO-LEATHER INDUSTRY PVT.LTD.CO.

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AWASH/ABYSSINIA TANNERY

አዋሽ/አቢሲኒያ ቆዳ ፋብሪካ

INTER OFFICE MEMO

የውስጥ ማስታወሻ መጻፍያ

To: Administration and Human Resource Department

From: Safety Officer

Date:

Subject: Accident Report

The detail of the accident in terms of insured people accident sick leave in relation to the accident and the paid amount is presented in the table below:

Ser.No.	Description	Quarter	Remark
1	Number of accident		
2	Number of injured people		
3	Sick leave due to accident /day/		
4	Payment due to accident /Birr/		

Best regards,

CC.

▶ Emergency Response Committee

ELICO