ASSESSMENT OF SAFETY ADHERENCE PRACTICES IN ENGINEERING WORKSHOPS IN SIERRALEONE

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Abstract: The human capital of any nation plays a significant contribution to economic growth and development through increasing production level and optimum utilization of resources. An efficient workforce mainly relies on the workplace safety environment. When safety procedures are carried out correctly, they reduce the likelihood of most work-related mishaps, which improves the working environment and fosters improved communication between staff and equipment for increased output.
Sierra Leone has a workplace safety law known as the "Factories Act 1974" but very little has been done to address the issue of health and safety in the workplace. Improving workers safety in Sierra Leone is challenging because of social, economic, literacy and political factors. Most workers in Sierra Leone workshops are semiskilled and illiterate and have not completed a very high level of formal education.
The study was conducted in Bo and Kenema districts situated in the Southern and Eastern provinces of Sierra Leone. Descriptive quantitative research method was adopted in this study. The target population was 200 technicians randomly selected from 40 workshops in Bo and Kenema cities (20 workshops from Bo and 20 workshops from Kenema).
The result of the investigation showed that youths are more engaged in these workshops with regrettably only 7.5% women workers. There were no safety signs clearly posted and visible within the workshops for all the workshops visited in Bo and Kenema; only 9 workshops (22.5%) acknowledged having PPEs; 92.5% of workshops have no formal reporting system for accidents; relied on verbal and informal reporting. 95% of workshops assessed said they never received safety training. The investigation done on the causes of accidents showed that 25.9% of accidents are caused by slip and falls, 21.2% by falling objects, 17.6% by overexertion among others. The research further reported that 90% of workshops were not compliance with the local environmental regulations regarding noise, emissions and waste disposal.
Among the key recommendations from the study include (a) The Sierra Leone Government, through appropriate authorities, should enforce the "Factories Act 1974" for workshops safety and health compliance. (b) Workshop owners and workers should be sensitized on the importance of workplace safety and (c) Workshop safety trainings and apprenticeship programmes should be introduced to these small and medium enterprises by government and probably NGOs irrespective of their academic levels.

Keywords: Safety adherence, workshop safety, human capital, compliance, environmental regulations, hazardous materials

1.0 INTRODUCTION

The human capital of any nation plays a significant contribution to economic growth and development through increasing production level and optimum utilization of resources. According to present indices, development evaluation of a country depends on the role of human resources capital in creating value addition. An organization's workforce is a highly important asset for success. It's essential for businesses to employ the right number of employees with the right skills and put them in suitable roles to ensure productivity and profitability.

Investment in human resources and educating and training human force to learn different skills to advance the production process can improve the production quality and leads to efficient use of material capital and optimum utilization of them through improving the skill and proficiency of the workforce, making them efficient and increasing capabilities (Mokhtari et al 2011). Investment in training is an important source of creating human capital like enabling the workforce and developing technical knowledge and regarded human resource as an important factor in economic development of a country.

Therefore, the foundation of a nation's development is its workforce. A motivated, well-trained, and healthy workforce boosts output and creates income, all of which are essential for the general well-being of surrounding community and the country.

An efficient workforce mainly relies on the workplace safety environment. Safety refers to the condition of being protected from harm, danger, risk, or injury. It encompasses measures, protocols, and practices implemented to prevent accidents, hazards, or undesirable incidents. When safety procedures are carried out correctly, they reduce the likelihood of most work-related mishaps, which improves the working environment and fosters improved communication between staff and equipment for increased output.

The World Health Organization (WHO) estimates that 200,000 people die in workplace accidents each year, 68 million to 157 million new cases of occupational disease are linked to hazardous exposures at work, and 100 million workers are wounded annually. The economic and social well-being of employees, their families, and dependents, as well as job productivity, are all significantly impacted by occupational illnesses and accidents (Veltri, 2011).
According to the Occupational safety and health administration (OSHA), the main goal of safety and health programs is to prevent workplace injuries, illnesses, and deaths, as well as the suffering and financial hardship these events can cause for workers, their families, and employers. Additionally, a safe work environment can lead to a better mental health, less anxiety and stress for employees.

Traditionally, workplace problems such as accidents or injuries are addressed only after a worker is injured or becomes sick as in the case for most small and medium scale workshops/enterprises like welding, electrical, mechanicals/garages, carpentry, blacksmiths, construction to name but few in Sierra Leone. Most owners and managers of local industrial workshops in Sierra Leone emphasize more on increasing productivity and profitability at the expense of the health and safety of their employees.

According to Krause (2000), for a company or institution to have the chance to become a world-class rank in terms of both safety and business, every employee must participate in the safety management process. Employee participation in safety-related initiatives is crucial, and the focus should be on improving the safety culture. This promotes employee adherence to safety regulations and increases personal accountability (Geller, 2005). Any responsible organization's top priority when it comes to occupational safety in the workplace today is to locate and remove any risks to workers' lives or health (Vincoli 1993).

Therefore, every effort should be made by workshop management and employers to provide the basic knowledge about safety to employees to avoid accidents from happening at the workplace.

OSHA provides recommended practices that recognize that finding and fixing hazards before they cause injury or illness is a far more effect approach. The benefits derive from implementation of this OSHA recommended practices by employers will include but not limited to prevent workplace injuries and illnesses, improve compliance with laws and regulations. reduce costs, including significant reductions in workers' compensation premiums. engage workers, enhance their social responsibility goals, increase productivity and enhance overall business operations (OSHA 2011).

This research work seeks to investigate the work safety compliance issue of small and medium scale workshops enterprises in Sierra Leone as prescribe by OSHA, which takes into consideration the follow: workers safety priority, lead by examples, implement a reporting system, provide training, conduct inspection, collect hazard control ideas, implement hazard controls, address emergencies, seek input on workplace changes and make improvement.

1.1 Problem Analysis

In most developing countries, workplace safety faces lot of challenges for both employers and employees. The perceived occupational safety and health (OSH) challenges include costs, lack of management commitment, inadequate safety culture, resource shortages, lack of enforcement, training deficiencies and lack of understanding of development.

Improving workers safety in Sierra Leone is challenging because of social, economic, literacy and political factors. Most workers in Sierra Leone workshops are semiskilled and illiterate and have not completed a very high level of formal education. Workshop heads' faces many economic challenges outside their control not limited to money for paying workers and rent for their workshops, the cost of equipment and materials. These creates financial pressure that may limit the ability of workshop management to afford safety equipment and professional health and safety services. In addition, Sierra Leone workshop businesses are often neglected by regulations and enforcement designed to protect workers and ensure a safe working environment. As a result, many workshops lack basic safety programs.

Sierra Leone has a workplace safety law known as the "Factories Act 1974" but very little has been done to address the issue of health and safety in the workplace. To date there is still little information that exists on the effectiveness of the Sierra Leone government initiatives regarding the promotion of health and safety regulations in engineering workshops. Accidents happens almost all the time in our local industries; acid spill on mechanics, blacksmiths get wounds from corroded metals all day and carpenters lose their fingers and fall from scaffolding. Hence, occupational health and safety is a concern in Sierra Leone. The country (Sierra Leone) has had an archaic safety law (since the colonial days) which made provisions for people to register their industries and report accidents, that law is not being implemented. In effect, one hardly sees factory or workshop inspectors around.

In Sierra Leone, the issue of health and safety has been and still treated with levity. The low level of education of workshop staffs/operators is a leading cause for most workshop accidents in Sierra Leone as they cannot read machine safety manuals, nor do they understand safety procedures.

The increase of occupational injuries and ill health cases in the workshop is worrisome, given its severe impact on employee's welfare and the high cost to businesses and country's economy (Casey and Krauss 2013). In essence, conscious effort by management to put in place safety measures and ensure that these rules are adhered to compel employees as well to be always safety conscious (Sikpa Francis Cudjoe, 2011).

An increasing number of workers in the Sierra Leone's local industries complain about psychological stress and overwork. These psychological factors have been found to be strongly associated with insomnia, depression and fatigue, and burn-out syndromes, as well as with elevated risks of cardiovascular diseases.

The consistent psychological stress and overwork coupled with high fatal accident rates in Sierra Leone justify the need for occupational health and safety education programs that focuses on prevention by instituting adequate health safety measures in place regularly monitored and reviewed by management to protect employees from these hazards and risks that could lead to avoidable deaths and ultimately lead to loss of trained staffs.

1.2 Aim and Objectives

The study aims at assessing the levels of safety compliance practices in engineering workshops in Sierra Leone with special reference to workshops in Bo and Kenema districts thereby providing recommendations that could contribute to the promotion of safe working environment and better livelihood for both employers, employees and their families.

The following objectives are pertinent to this study: To assess (a) the general safety practices adopted (b) the causes of accidents in local workshops (c) the level of safety compliance by employers and employees (d) Accidents reporting procedures. (e) To know whether there are regular safety trainings provided by employers.

2.0 LITERATURE REVIEW

One of the most significant areas of human concern is occupational health and safety. Its goal is to modify the working environment to suit employees to support and preserve the maximum level of social, mental, and physical well-being for workers across all professions. Safety management must therefore be held directly accountable for safety. This implies that all members of a business or organization are subject to accountability (Horn et al, 2017). According to Kruse (2000), executives at prosperous companies are evaluated not just based on financial metrics but also on their capacity to incorporate safety measures into daily operations.

Workers are exposed to industrial accidents because of increased industrialization worldwide with African nations bearing the most serious consequence. Workers face illnesses and accidents at work that cause major injuries and even fatalities every day as they go about their duties throughout the world (Pinto et al., 2011). Industrial accidents have the potential to cause financial losses, a reduction in human capital, injury to technology and machinery, and reputational damage to the involved businesses. Around the world, over 270 million workplace accidents and 160 million occupational illnesses are recorded annually (Pouliakas and Theodossiou, 2003).

By law the provision of safe and secure working environment is mandatory as outlined by Ofori (2010). However, Hamden & Awang (2015) argues that this may be obstructed by many factors such as the area or country. Most African nations are noted for having below normal level or standard health and safety management systems due to the rise in recordable injuries, missed workdays, and workers' compensation insurance expenses, (Pupalampu and Quartey 2004). In developing countries like Sierra Leone, the provision of safe and secured construction site is a huge challenge.

According to WHO (2014), a single safety message should be communicated by each safety signboard and any related supplemental signboards. It is not permitted to use composite signs that convey multiple safety messages. It is not appropriate to use graphic symbols to express more than one safety message. When using safety goggles and helmets,

for instance, it is necessary, two signboards should be employed. It is not appropriate to integrate the safety goggles and helmet into a single graphical representation. Every portable electrical device needs to have its electrical safety checked and tested on a regular basis. Every air receiver needs to be thoroughly inspected at the legally mandated times, and where appropriate, local exhaust ventilation (LEV) needs to be used.

Making working conditions healthy and safe is in the interest of workers, employers and governments, as well as the public at large. Although it seems simple and obvious, this idea has not yet gained meaningful universal recognition. Hundreds of people in local industries in Sierra Leone are employed today in conditions that breed ill health and/or are unsafe.

According to Ethiopia Public health Training Initiative (EPTHI) 2006, only 5-10% of workers in developing countries and 20-50% of workers in industrial countries (with a few exceptions) are estimated to have access to adequate occupational health services. Even in advanced economies, a large proportion of work sites are not regularly inspected for occupational health and safety.

3.0 METHODOLOGY

3.1 The Study Area

The study was conducted in Bo and Kenema districts situated in the Southern and Eastern provinces of Sierra Leone respectively with a total population of 575,478 residents in Bo and 609,891 residents in Kenema district according to the 2015 population and housing census. The major economic activities of the district population are gold and diamond mining, other activities include trading, agricultural production of rice and root crops, cash crops such coffee, cacao and oil palm plantation.

Bo is the third largest city in Sierra Leone by population (after Freetown and Kenema) and the largest city in the Southern Province. Bo is the capital and administrative center of Bo District. The city of Bo has a population of 223,075 based on 2021 national mid-term census estimates. Bo is an urban center and lies approximately 160 miles (250 km) east-southeast of Freetown, and about 40 miles (64 km) to Kenema. Bo is the leading financial, educational and economic center of southern Sierra Leone.

Based on the 2021 national mid-term census, Kenema has a population of 255,110. making it the second most populous city in Sierra Leone after Freetown, and the largest city in the country's Eastern Province. Kenema City servers as capital of Kenema District and is a major economic hub in the Eastern Province.

Figure 1: Map of Sierra Leone showing Bo and Kenema Districts

3.2 Research Design

In this design the descriptive quantitative technique was used. The method allows the researchers to accurately describe and summarize data using numerical and graphical techniques. This method provides a clear and concise way to present data, making it easier to analyze and interpret the results.

3.4 Study Population

In this study the target population was 200 technicians randomly selected from 40 workshops in Bo and Kenema cities (20 workshops from Bo and 20 workshops from Kenema) as presented in Table 1.

3.5 Sampling Design and Data collection Procedure

Data for this study was gathered from both primary and secondary sources. Primary data was collected directly from respondents using a developed tool (Semi-structured questionnaire and Key Informants Interview guide). Secondary data was collected from variety of sources like journals, publications, and internet resources. This was done to provide foundation of the work and guide the researchers in conducting the study.

A semi-structured questionnaire was administered to 160 technicians from 8 technical workshops (Table1) using Kobo collect software supported by MS Excel in the analyses and the information were presented using graphs and tables.

Table 1: Workshops sampled in the study

No.	Types of workshops selected	Sample frame			
		Bo		Kenema	
		Sampling unit	Sample size	Sampling unit	Sample size
1	Welding/metal work	2	10	2	10
2	Carpentry	2	10	2	10
3	Electrical/refrigeration	2	10	2	10
4	Black smithery	2	10	2	10
5	Garages (vehicles & motorbikes)	2	10	2	10
6	Plumbing	2	10	2	10
7	Auto mechanic	2	10	2	10
8	Tin smithery	2	10	2	10
9	Tailoring	2	10	2	10
10	Building construction	2	10	2	10
Total per district		20	100	20	100
Grand total (Workshops)		40			
Total sample size		200			

3.6 Sample Size

A sample size of 200 technicians was randomly selected from 40 workshops: 20 workshops from Bo and 20 workshops from Kenema. 10 types of workshops were used in the study namely welding/metalwork, carpentry, electrical/refrigeration, black smithery, garages (vehicles and motorbikes, plumbing, auto mechanic and tin smithery, tailoring and building construction. From each of the 10 types of workshops, 2 workshops were randomly selected giving a total of 20 workshops for Bo and 20 workshops for Kenema as presented in Table 1.

3.7 Data Analysis Procedure

Following the collection of all relevant data from the target population, the researcher classified and summarized all of the responses based on the information provided by the respondents. The data was then statistically analyzed using Microsoft Excel and Statistical Product Services Solution (SPSS) data analysis program. The results of the analyses were presented in tables and graphs.

4.0 DISCUSSION OF RESULTS

4.1 Demography

Age structure

The age structure of the technicians was assessed, and results presented in Figure 2. The results show that youths are more actively engaged in workshops. Out of the 40 workshops investigated, 27 (67.5%) of them have youthful workers

with ages ranging 18yrs to 30yrs. Workers within the ages of 18yrs to 20yrs are apprentices who were mostly school dropouts seeking to learn technical skills that could improve their livelihoods.

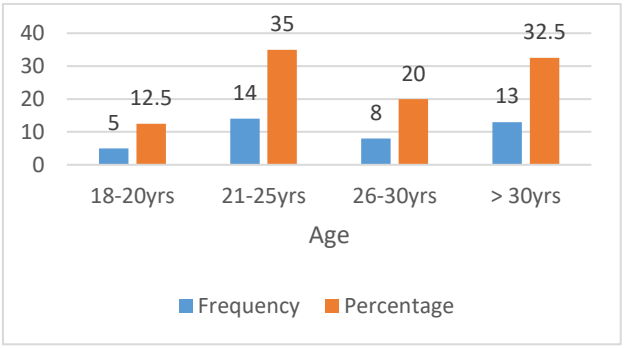

Figure 2: Age structure of workshop workers

Gender status of workers

An assessment done on the gender status of the workshops workers regrettable showed that only 7.5% of workers are women as presented in Figure 2. A further prone into the reason why low percentage of women revealed that women are not interested in workshops jobs like garages which they consider to be dirty, degrading and very low-income earning jobs that could not elevate their status. The few female workers interviewed explained the dire need to learn a trade since they are single mothers abandoned by their supposed husbands with nobody to lean on for help. They further expressed their interest in owning their own workshops soon.

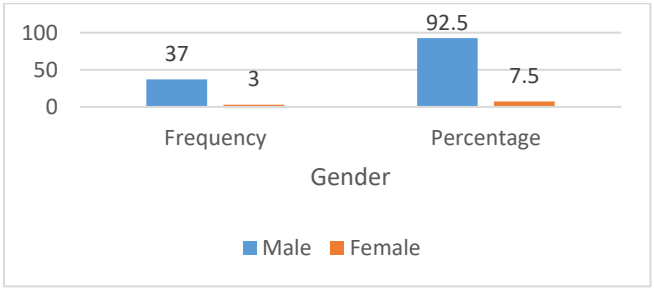

Figure 3: Gender status of workers

Number of employees

The results of the investigation of the number of workers in these workshops reported that 42.5% of workshops in Bo and Kenema have 6 to 10 workers. The research found out that workshops with above 10 workers are bigger garages which have a combination of fitter mechanics, auto mechanics, and vehicle panel/spraying mechanics. On the average, smaller workshops have 1 to 5 workers which represents 25% of the results as showed in Figure 4.

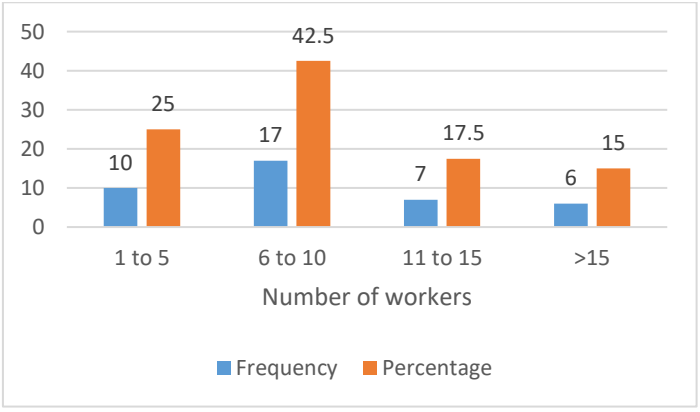

Figure 4: Number of workers in the workshops

4.2 General Safety Practices

Safety Signs

The result of the investigation showed that no safety signs were clearly posted and visible within the workshops for all the workshops visited in Bo and Kenema. Among the reasons given in Figure 5, 57.5% of the workshops said they were not aware of the importance of safety signs in workshops; 32.5% stressed on the cost of the signpost which they could not afford.

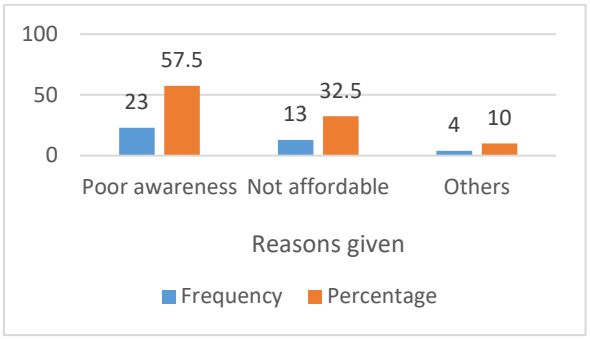

Figure 5: Reasons for not displaying safety signs

Personal Protective Gears (PPEs)

Among the 40 workshops investigated, 9 workshops (22.5%) acknowledged having PPEs although 64% of workers from these 9 workshops claimed to have provided these PPEs by themselves. 31 workshops (77.5%) said they do not have PPEs neither supplied to them by their employers. Figure 6 presents results of the types of PPEs supplied.

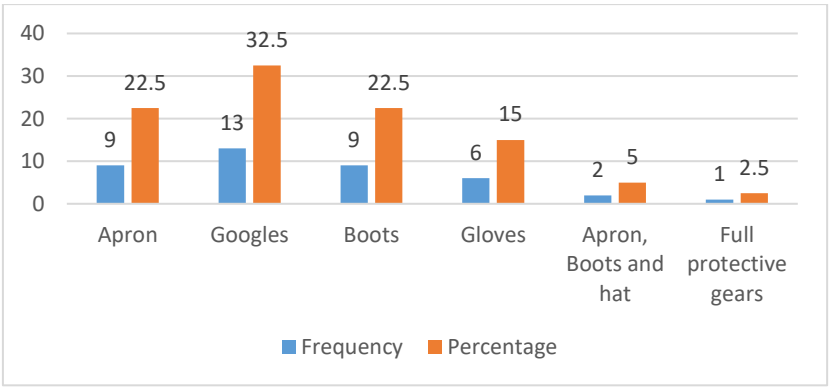

Figure 6: Types of PPEs

Storage and handling of hazardous materials

The investigation showed that 80% of workshops have no storage space for hazardous materials like used oils, carbides, batteries, fuel and other materials. They accepted disposing these materials in drainages or cabbage collector's pick-up. Further investigation as to why they do not have storage space for these hazardous materials revealed results presented in Figure 7. 68.8% of the workshops said they have very small workshop space that could not allow them to have a special room for keeping materials. Further asked how they keep their tools, they told researchers that each of them has either a storage box or back boots of abandoned vehicles, especially for vehicle garages.

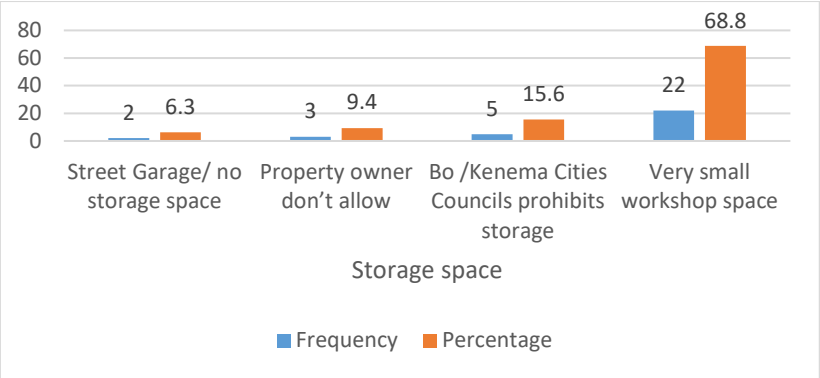

Figure 7: Reasons given for no storage space

Availability of fire extinguishers

The research results showed that 92.5% of the workshops assessed do not have fire extinguishers readily accessible, regularly inspected and properly maintained. They relied on the non-reliable, inefficient and ineffective Sierra Leone Fire Force for any fire eventuality. This has caused lives and properties to both workshops owners and employees in Bo and Kenema.

Workshop layout

An assessment done on the suitability of the workshop's layouts designed to minimize hazardous materials and promote safe workflows showed that no workshop safety consideration was done during the design and construction phases of their workshops. Most of the workshops are proposed building construction sites/plots temporarily leased by workshop owners with no mandate to do any modification on the property. As a result, most of the workshop's layout were not designed to minimized hazardous materials and promote safe work flows as presented in Table 8.

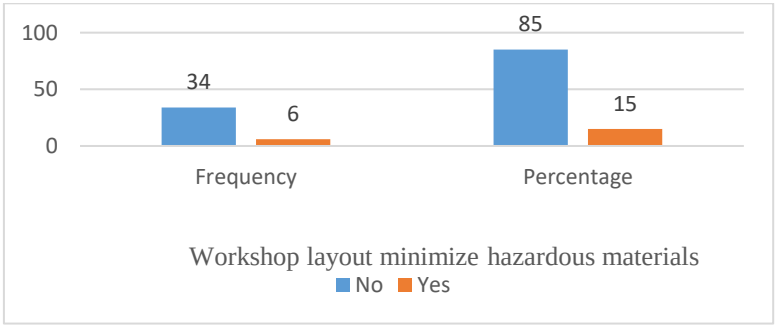

Figure 8: Consideration of workshop layout to minimize hazardous materials

4.3 Safety Training Sessions

The researchers were also interested to know whether employees were provided with regular safety training sessions. Regrettably 95% of workshops assessed said they never received safety training as shown in Figure 9. The reason being that most of these workshops are managed by illiterate bosses who themselves were locally trained through informal education, so the issue of safety training sessions is not only new to them but unheard of in the entire period of their professions.

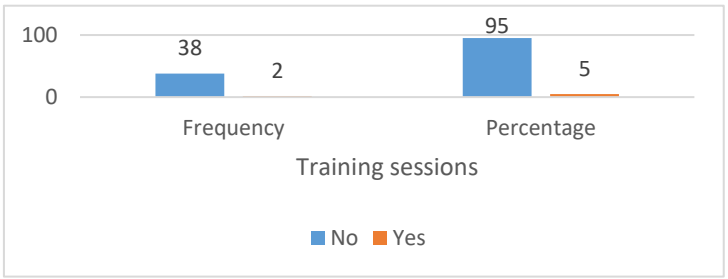

Figure 9: Safety training sessions conducted

Furthermore, the researchers proned into reasons why no safety training sessions were conducted and results presented in Figure 10. From the results, 17.5% were not registered entities, 15% lack training funds and 12.5% of employees not interested in any safety training as they are youths and school dropouts who distest attending formal education system, hence seeing the safety trainings boring and time consuming.

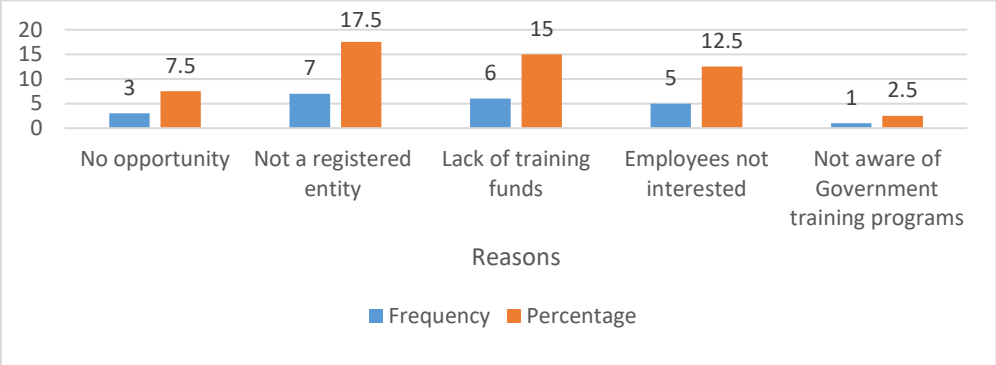

Figure 10: Reasons for not conducting safety training sessions

The research found 92.5% (37) workshops out of the 40 workshops never gave safety orientation to their newly recruited employees the reasons given are presented in Figure 11.

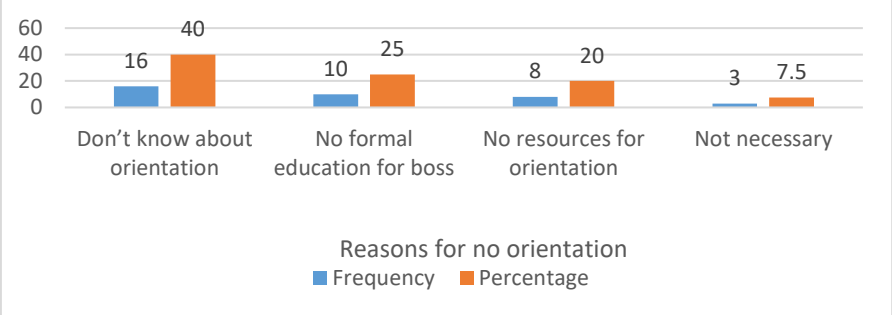

Figure 11: Reasons for not given safety orientation to employees

4.4 Accidents Reporting

The assessment done on the formal process for reporting accidents revealed that 92.5% of workshops in Bo and Kenema have no formal reporting system for accidents; relied on verbal and informal reporting. The research further found that 85% of the workshops do not have First-Aid Kits to treat minor wounds and reasons given presented in Figure 12.

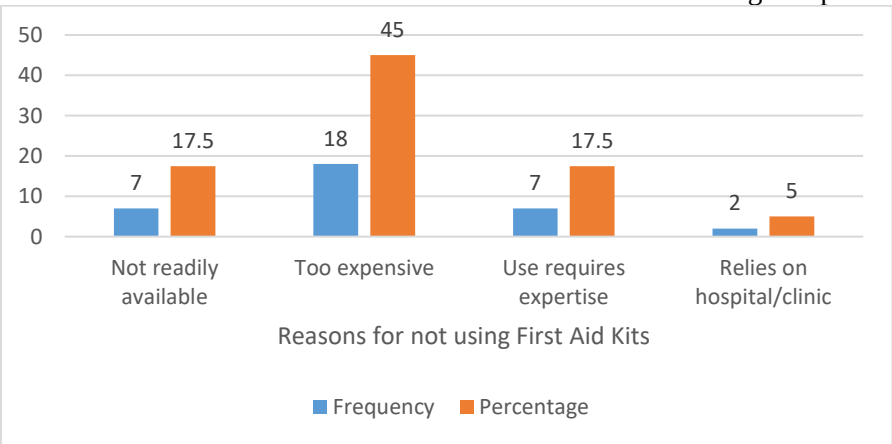

Figure 12: Reasons for not having First-Aid Kits

The investigation done on the causes of accidents showed that 25.9% of accidents are caused by slip and falls, 21.2% by falling objects, 17.6% by overexertion among others as presented in Figure 13.

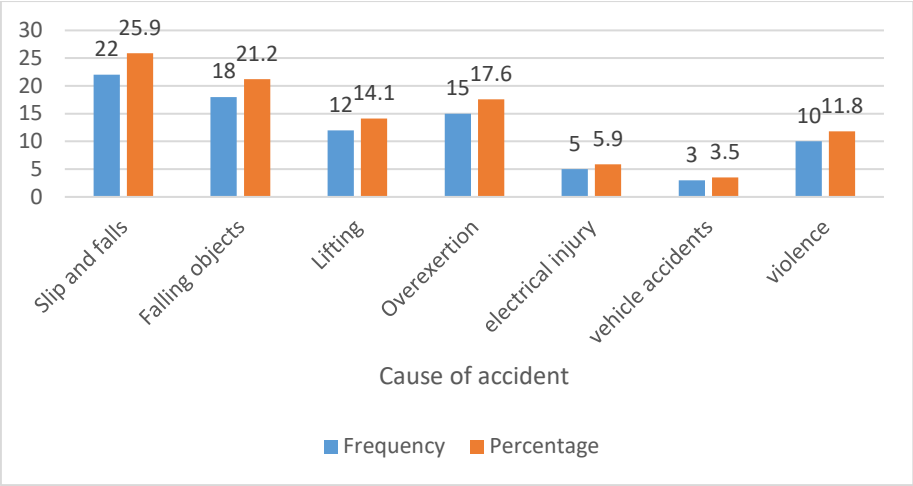

Figure 13: Causes of accidents

72.5% of the workshops investigated provide treatments for employees as attested by the employees themselves. Workers are either treated in hospitals, clinic, given First Aid among others as shown in Figure 14.

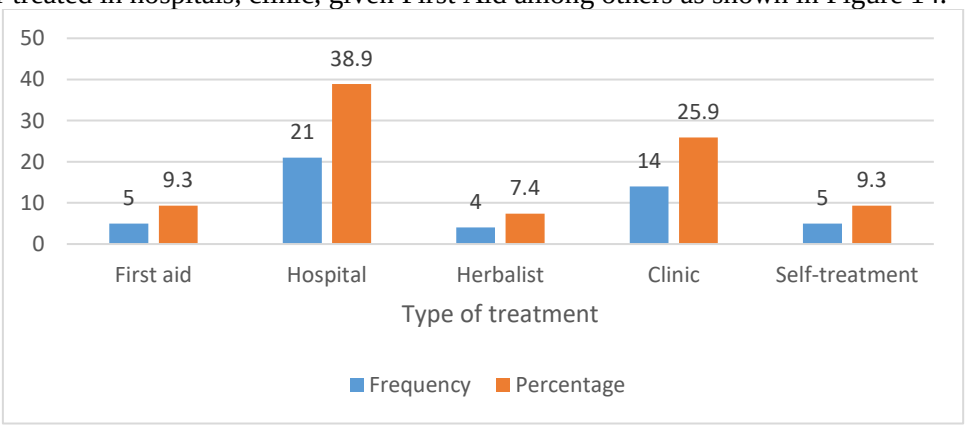

Figure 14: Types of treatment for workers

4.5 Workshops Compliance with Local Environmental Regulations regarding Noise, Emissions and Waste Disposal

The research reported that 90% of workshops were not compliance with the local environmental regulations regarding noise, emissions and waste disposal. Figure 15 presents reasons for this non-compliance.

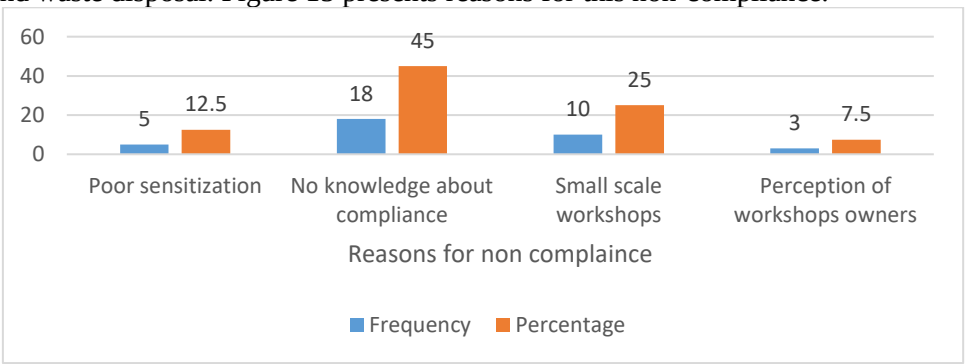

Figure 15: Reasons for non-compliance with local environmental regulations

Welding Mechanical Black smithery Carpentry

Figure 15: Pictures showing the non-compliance of workshops

5.0 CONCLUSIONS

The human capital of any nation plays a significant contribution to economic growth and development through increasing production level and optimum utilization of resources. It's essential for businesses to employ the right number of employees with the right skills and put them in suitable roles to ensure productivity and profitability.

An efficient workforce mainly relies on the workplace safety environment. When safety procedures are carried out correctly, they reduce the likelihood of most work-related mishaps, which improves the working environment and fosters improved communication between staff and equipment for increased output.

Traditionally, workplace problems such as accidents or injuries are addressed only after a worker is injured or becomes sick as in the case for most small and medium scale workshops/enterprises.

Improving workers safety in Sierra Leone is challenging because of social, economic, literacy and political factors. Most workers in Sierra Leone workshops are semiskilled and illiterate and have not completed a very high level of formal education.

Sierra Leone has a workplace safety law known as the “Factories Act 1974” but very little has been done to address the issue of health and safety in the workplace. Most owners and managers of local industrial workshops in Sierra Leone emphasize more on increasing productivity and profitability at the expense of the health and safety of their employees. Making working conditions healthy and safe is in the interest of workers, employers and governments, as well as the public at large. Although it seems simple and obvious, this idea has not yet gained meaningful universal recognition. Hundreds of people in local industries in Sierra Leone are employed today in conditions that breed ill health and/or are unsafe.

The study was conducted in Bo and Kenema districts situated in the Southern and Eastern provinces of Sierra Leone respectively with a total population of 575,478 residents in Bo and 609,891 residents in Kenema district according to the 2015 population and housing census.

Descriptive quantitative research method was adopted in this study. The target population was 200 technicians randomly selected from 40 workshops in Bo and Kenema cities (20 workshops from Bo and 20 workshops from Kenema). 92.5% of the workshops assessed do not have fire extinguishers readily accessible, regularly inspected and properly maintained.

The results show that youths are more actively engaged in workshops. An assessment done on the gender status of the workshops workers regrettable showed that only 7.5% of workers are women. The results of the investigation of the number of workers in these workshops reported that 42.5% of workshops in Bo and Kenema have 6 to 10 workers. The research found out that workshops with above 10 workers are bigger garages which have a combination of mechanics, auto mechanics, and vehicle panel/spraying mechanics.

The result of the investigation showed that no safety signs were clearly posted and visible within the workshops for all the workshops visited in Bo and Kenema. Among the 40 workshops investigated, only 9 workshops (22.5%) acknowledged having PPEs. An assessment done on the suitability of the workshop’s layouts designed to minimize hazardous materials and promote safe workflows showed that no workshop safety consideration was done during the design and construction phases of their workshops.

92.5% of workshops in Bo and Kenema have no formal reporting system for accidents; relied on verbal and informal reporting. Regrettably 95% of workshops assessed said they never received safety training.

The investigation done on the causes of accidents showed that 25.9% of accidents are caused by slip and falls, 21.2% by falling objects, 17.6% by overexertion among others. 72.5% of the workshops investigated provide treatments for employees as attested by the employees themselves. Workers are either treated in hospitals, clinic, given First Aid.

The research reported that 90% of workshops were not compliance with the local environmental regulations regarding noise, emissions and waste disposal.

7.0 RECOMMENDATIONS

From the results of this research, the following recommendations could be made:

1. The Sierra Leone Government, through appropriate authorities, should enforce the "Factories Act 1974" for workshops safety and health compliance.
2. Workshop owners and workers should be sensitized on the importance of workplace safety.
3. Workshop safety trainings and apprenticeship programmes should be introduced to these small and medium enterprises by government and probably NGOs irrespective of their academic levels.
4. Introduction of loan schemes to workshops technicians/owners could help in upgrading their workshops to meet the required safety and health compliance standards.
5. Strategies should be adopted to encourage more women to come to the technical field.

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