

## ASSESSMENT OF SAFETY PRACTICES IN SAWMILL INDUSTRIES IN AKURE SOUTH LOCAL GOVERNMENT AREA, ONDO STATE, NIGERIA

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**Citation:** Mayowa OJ, Assessment of Safety Practices in Sawmill Industries in Akure South Local Government Area, Ondo State, Nigeria. *J Ind Pollut Control*. 2023;39:005.

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**Received:** 04-May-2023, Manuscript No. ICP-23-97752; **Editor assigned:** 10-May-2023, PreQC No. ICP-23-97752 (PQ); **Reviewed:** 24-May-2023, QC No. ICP-23-97752; **Revised:** 29-May-2023, Manuscript No. ICP-23-97752 (A); **Published:** 06-Jun-2023, DOI: 10.4172/0970-2083.005

**Key words:** Hazards, Personal protective equipment, Injuries, Safety, Sawmill, Industries

### ABSTRACT

Safety practices and workers compliance with safety rules are necessary guidelines in ensuring smooth and undisturbed operations in the sawmilling industries. Assessment of a safe working environment was carried out in Akure South Local Government Area (LGA) of Ondo State, Nigeria using questionnaire, on-the-spot assessment, and noise pollution evaluation. A total number of 14 sawmills from 7 different locations across the local government areas were studied and the data collected were subjected to descriptive analysis. The categorization of the mills is essentially distributed across small, medium, and large scales in the proportion of 14%, 14% and 72% respectively. Workers gender and educational background indicated that 75% of the workers were male with a low level of education and minimal working experience. On the use of PPE, 65.9% of the workers were not familiar with the use of PPE while 52.3% of sawmills are reluctant to use PPE. Furthermore, the study revealed that the noise produced by the machines was above the minimum of 85 Db with the band saw and circular saw machines producing noise above the bearable level. Investigation revealed that workers complained of headaches, skin/eye irritation, and respiratory problem. On the occurrence of an accident, 54.6% of the sawmill employees attested to having recorded accident during the course of using the machine while 56.8% of the accidents are minor injuries. Low levels of safety awareness and compliance were observed among the sawmill workers in the Local Government Area necessitating the need for safety training sensitization.

### INTRODUCTION

Sawmilling machinery activities and its attendant exposure of the workers in the mill to health hazards and accidents require that precautionary measures are taken to protect workers. The types of machines used in the sawmilling industry vary with the levels of technology and complexity of each mill. The nature of the work done by woodworkers and the types of equipment and materials they handle may constitute a hazard if not properly handled. These hazards and injuries resulting from such incidences may include being caught in or struck by machinery, falling from a height, heavy lifting or repetitive

movements, twisting or reaching and inhaling toxic chemicals. Noise also constitutes major pollution and a source of concern in sawmills affecting the concentration of workers and workflow.

Besides the hazards inherent are unfavorable weather conditions, noise, and dust pollution that are injurious to human health (Judd, et al., 2004). Human factors, which affect the working capacity and daily production efficiency, include individual characteristics such as gender, age, body size, physical fitness, nutritional, and state of health (Jekayinfa, 2007). There is a need to create awareness on machine safety practices to avoid hazards in sawmills. Thus, individual machines must be evaluated so as

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to be in good condition for specific operations. An understanding of safety measures is necessary to address the engineering and administrative controls.

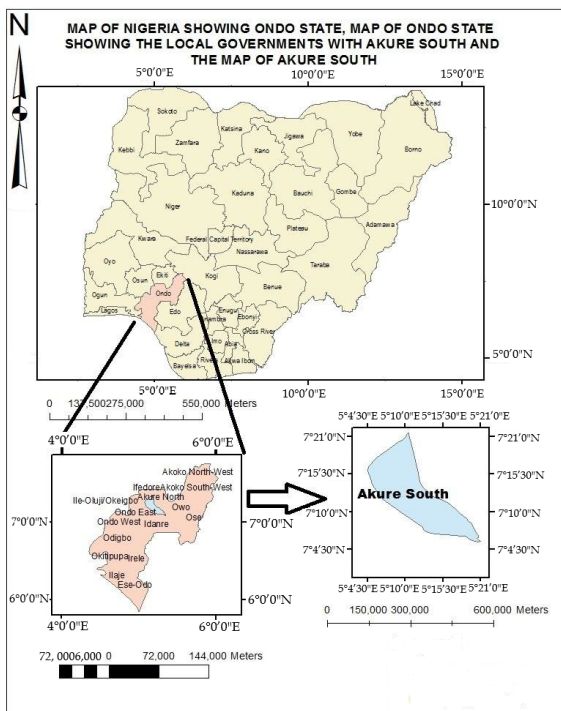
These hazards in wood workshops and the sawmill industry include environmental hazards as a result of poor safety practices and management, poor solid waste management, noise hazards due to machinery use, and ergonomic hazards resulting from lifting heavy loads, reaching for objects, repetitive work and poor work posture (Aruofor,2000). The use of safe working practices in wood workshops and sawmills has been neglected and these have caused a lot of accidents for many woodworkers and saw millers.

These incidences have necessitated a probe into the causes of accidents in the sawmills with a view to providing solutions and recommending ways of managing some of these hazards. Assessment of the state of compliance was therefore carried out to ascertain the level of safety compliance in the sawmills in Akure South LGA, Nigeria.

## MATERIALS AND METHODS

### Location of Study Area

The study was carried out in Akure South LGA capturing fourteen sawmills that were selected randomly in seven locations to assess their status of safety practices Fig. 1.



**Fig. 1** Map of akure south local government area of Ondo state, Nigeria. **Note:** ( ) Ondo State; ( ) Nigeria states.

### Data Collection

The current safety status of safety practices of sawmills in Ondo State was assessed by obtaining secondary data from the available record at the Ondo State Ministry of Agriculture and Natural Resources and primary data

with Questionnaires administered to saw millers. The investigation of noise pollution associated with the use of machines in the mills was assessed with Noise Level Meter (Plate 1) to determine the level of noise generated by machines (Fig. 2).



**Fig. 2** Plate 1; Noise level meter.

## METHODOLOGY

The study adopted a random sampling method to draw respondents from the targeted population which are the sawmill industries. The sawmill industries were randomly selected in the study area. When selecting the sampling frame and the sample size; the strata selection focused on work categories (chain saw operators, log mechanics, sawmill machine operators, and employer's managers). A selection of a simple random sample from each of the resulting strata was made, to minimize the sampling errors or biasness of the sample.

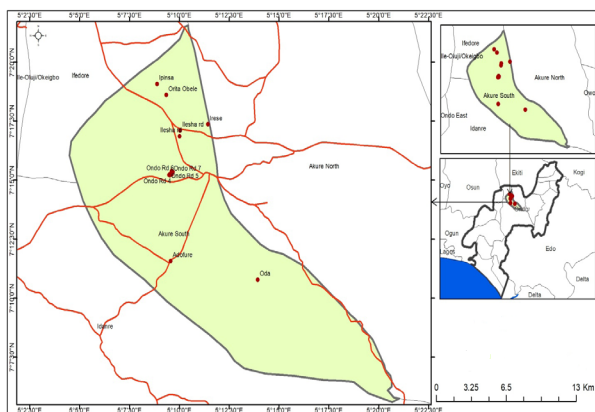
### Data Analysis

The collected data were presented with Statistical Package for the Social Science (SPSS) and Excel Microsoft Software to obtain the descriptive statistics and Analysis of Variance (ANOVA). All analysis was carried out at a 95% probability level.

## RESULTS AND DISCUSSION

### Sawmills Distribution in Akure South Local Government

The coordinates of each of the selected sawmills were obtained using Geographical Positioning System (GPS) (Fig.3). These points were indicated on the already prepared map of Akure South Local government using Geographical Information System (GIS) software version (ArcGIS 10.6).



**Fig. 3** Location of sawmill in Akure South Local Government Area. **Note:** (●) Location; (—) Major Road; (■) Akure South LGA.

The distribution of Sawmills in Akure South Local Government presented in Table 1 revealed that 70% of the sawmills were located at Ondo Road, 9% at Ilesha Toad, 6% at Oda Road and Ipinsa Road, and 3% at Idanre Road, Orita Obele, and Irese respectively. Based on proximity, 72.9% of the sawmills were sited in industrial estate while 27.3% were sited in residential estate. Demographic Characteristics of the Respondents.

**Tab. 1.** Textural classification. actual density (Dr). apparent density (Da) and porosity (P) of studied soils

Location	Frequency	Percentage (%)
Idanre road	1	3%
Ilesha road	3	9%
Oda road	2	6%
Ipinsa	2	6%
Ondo road	24	70%
Orita Obele	1	3%
Irese	1	3%

The demographic characteristics and education qualifications of workers engaged in the sawmills in Table 2. Showed that 75% were male while 25% were female, 11.4% of the age group falls within 10-20 years, 18.2% ranges between 21-30 years, 43.2% ranges between 31-40 years, 22.7% ranges between 41-50 years and 4.5% has their age to be above 50 years. On the marital status of the respondents, 47.7% were singles while 52.3% were married. The level of education of the respondents equally shows that 9.1% of the respondents had primary school education, 31.8% were secondary school holders, 20.5% had tertiary qualifications and 38.6% of the respondents had no formal education. The working structure of the mill worker are grouped into different department which 15.9% are loggers, 13.6% are in the maintenance section, 50% are Operators, 15.9% are found to be the manager and 4.5% includes other departments.

The results of this study revealed that more males (75%) are engaged in sawmilling activities because of the nature of the job which requires standing posture thus, agreeing with Agbana that the majority of the sawmill workers were males considering the strenuous, heavy,

and dusty nature of the job (Agbana, et al., 2021).

Generally, the majority of the sawmill workers fall within the low-education group. Akinbode and Agbana in their report state that an appreciable proportion of the operator acquires at least a secondary school education (Agbana, et al., 2021; Akinbode, 2019). However, it was observed that the majority of the respondents are working in the sawmills as a result of unemployment and the means of survival. Most of the workers are married and are of active age range which is between the range of 31-40 years, this agrees with the report of Jekayinfa that human factors, which affect the working capacity and the daily production efficiency, include the individual characteristics such as gender, age, body size, physical fitness, nutritional and state of health (Jekayinfa,2007).

**Tab. 2.** Demographic characteristics of the sawmill workers in Akure South Local Government, Ondo state

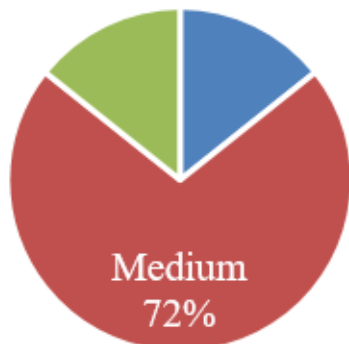
Criteria	Variant	Frequency	Percentage (%)
Age	10-20 years	5	11.4
	21-30 years	8	18.2
	31-40 years	19	43.2
	41-50 years	10	22.7
	>51 years	2	4.5
	Total		44
Gender	Female	11	25
	Male	33	75
	Total	44	100
Marital status	Married	23	52.3
	Single	21	47.7
	Total	44	100
Education	Primary	4	9.1
	Secondary	14	31.8
	Tertiary	9	20.5
	No Formal	17	36.6
Total		44	100
Department	Loggers	7	15.9
	Operators	22	50
	Maintenance	6	13.6
	Manager	7	15.9
	Others	2	4.5
	Total	44	100

### Status of Sawmill in Akure South Local Government

Most of the sawmills are found to be in the industrial estate and the majority of the workers reportedly work on the machine for 8 hours while the type of machine used were mainly imported machines. The study showed that most of the sawmills did not have a good layout and the workers lift heavy materials due to the lack of handling equipment. This is in line with Osagbemi, that there is inadequate knowledge and a lack of competencies in plant design, selection of appropriate technologies, planning layout, equipment, and tools as well as in production en-

gineering and plant operations in the sawmill (Osagbemi,etal.,2010). The majority of machines identified were sharpening machine, mighty mite, and wood misers, in which circular saw and band saw were found to be the highest machine present in the sawmill in terms of frequency. There are several types of sawmill machinery in operation today, including circular saws, cutting tools, log frame sawing tools, muley saws, gang saws, and band saws (How et al., 2009).

The study showed a decline in the number of sawmills in AKSLGA because of the erratic electricity supply, land tenure system, government policy on the tax, and inadequate monitoring of forest trees. The study revealed that there are 34 sawmills in the Akure South Local Government area according to the source of information gotten from the Ministry of Agriculture and natural resources, it was observed that most of the sawmills are located at Ondo Road because of the road accessibility and the high electricity supply. The visited sawmill were grouped on a scale level and it was found that the majority of the sawmill are of medium scale and they have average numbers of sawmill workers except for only Armanda sawmill which is high scale and has the highest number of sawmill workers (Fig.4). The increasing demand for timber has equally increased sawmilling activities and exposure of the workers in the sawmilling industry to health hazards and accidents when safety precautions are not put into consideration during the activities of the sawmilling industry (Judd, et al., 2004).



**Fig. 4** Status of sawmill. **Note:** (■) High; (■)Medium;9■) Small.

#### Safety Compliance to the use of PPE

There is low a level of safety compliance among the sawmill workers due lack of safety awareness among the workers since the majority of the workers have little or no formal education. The most commonly used PPE is a nose mask. The result of ratings of safety compliance across the selected sawmill in AKSLGA shown in Table 3 revealed that Armanda has 100% full compliance. Armanda Sawmill has the highest level of compliance with the use of personal protective equipment because they fall into high-scale categories and most of the workers have a high level of education than others and have some expatriates in their role.

The workers should be trained on how to use PPE, Some of the personal protective devices to be used in indus-

tries include dust masks, respirators, ear muffs, goggles, gloves, and overalls. Going by the ratings, Bota sawmill has 14.3% (not comply), Goamco sawmill has 0% compliance (not comply), Yabsol has 57.2% (partial compliance), Yisa sawmill has 42.9% (partial compliance), Fakin sawmill has 42.9% (partial compliance), Peypey sawmill has 14.3% (not comply), St. Joseph sawmill has 14.3% (not comply), Adonai sawmill has 14.3% (not comply), Golden Allen sawmill has 14.3% (not comply), Tamora sawmill has 28.8% (just comply), Adebisi sawmill has 28.8% (just comply), Ogunbo sawmill has 14.3% (not comply) and Ajayi sawmill has 42.9% (partial compliance).

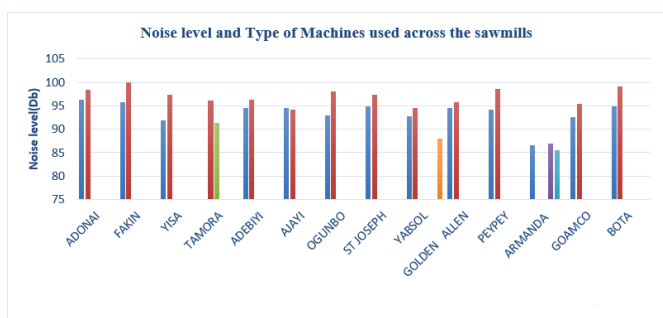
It was also revealed that the majority of the sawmill lack proper waste management systems as dust, smoke, and wood smells are released indiscriminately into the air causing environmental pollution which is toxic to workers, most of the sawmills did not have streams or rivers nearby which can cause discharge of toxic substance to the river. The hazards in the sawmill industry include environmental hazards as a result of poor safety practices and management, poor solid waste management, noise hazards due to machinery use, and ergonomic hazards resulting from lifting with heavy loads, reaching for objects, repetitive work, and poor work posture (Arufor,2000).

Sawmill workers must oblige to the rules and regulations guiding the sawmill operations so as to avoid accidents, this confirms the assertion of (Mong'are, et al., 2017) who reported in their findings that the employer should monitor the systems of work and provide refresher training to ensure that safe systems and work practices are being followed, including the use of personal protective equipment. Also, (Asogwa, 2008) in his research reported that taking attention away from woodworking machines is a recipe for disaster. Protection is the last line of action in the prevention of accidents.

#### Noise level and Types of Machines Present across the Sawmills

This study showed that most of the machines used in the sawmill produce noise above the accepted level of 85 Db which have a long-term effect on the workers' health and especially on the residents in nearby buildings which correspond to the report of (Health and Safety. 2005). That the exposure to continuous noise of more than 85 to 90Db, particularly a lifetime in industrial settings leads to hearing impairment and ultimately hearing loss.

The results revealed that circular saw and band saw are the major types of machine that are commonly used in the sawmills in which band saw has the mean noise frequency of 97.58db(A) at the machine spot, 94.78db(A) at 3 meters away from the machine, 92.37db(A) at 6 meters away from the machine and 89.08db(A) at 9 m away from the machine while circular saw has a mean noise level of 102.44db(A) at the machine spot, 98.75db(A) at 3 meters away, 95.92db(A) at 6 meters away and 89.08db(A). The result implies that the circular saw machine produces the highest noise frequency than the band saw (Fig.5).



**Fig. 5** Noise level and type of machines used across the sawmill. **Note:** (■) Band Saw(CD6); (■) Circular Saw; (■) Mighty Mite; (■) Multiple Edger; (■) Cross Cutting; (■) Wood Mincer.

Symptoms of short or long periods of exposure to noise include auditory effects such as auditory fatigue and hearing loss, and indirect non auditory effects such as speech interference, annoyance, lowered mental peace and task performance, and several psychological changes ( Ambekar, 2006; Duggal, 2007; Akinbode 2019). Noise pollution generated from the operations of machines and other equipment has a negative impact on the health of the workers and residents if not regulated (Akinbode 2019; Agbana 2021).

Research showed that most of the sawmills did not have any technique to prevent and reduce noise so also, the noise level is not regulated in the sawmill. The most commonly used machine which is the band saw and circular are the most commonly used machine in the sawmill is detected to have the highest frequency of noise frequency usually above 100dB(A). (Faruwa, et al., 2017).

**Safety Practices and Accidents in Sawmills**

Most of the sawmill workers are not familiar with the use of PPE while working in the sawmill and majority disregard the use safety practices equipment base on the fact that most workers are crude and there is no or better protective equipment.

The results from Table 3 showed that 47.7% of the sawmills trained their workers on safety practices and create awareness programme while 52.3% of the sawmills did not create safety awareness programme to train the workers on how to observe safety practices in the sawmill, 59.1% of the workers in the sawmill are familiar with the use of personal protective equipment in the sawmill and 40.9% are familiar with the use of personal protective equipment in the sawmill, on the basis of using personal protective equipment, 34.1% of the sawmill workers are willingly to use personal protective equipment while 65.9% are not willingly to use personal protective equipment, 13.6% of the sawmills had lifting device while 86.4% of the sawmills did not have lifting device, 90.9% of the sawmill workers were found to lift heavy materials manually while 9.1% of the workers lift heavy materials with lifting device, 45.5% of the sawmill workers noted that accident had been recorded during the cause of using the machine while 54.3% explained that there is no occurrence of accident, the most preva-

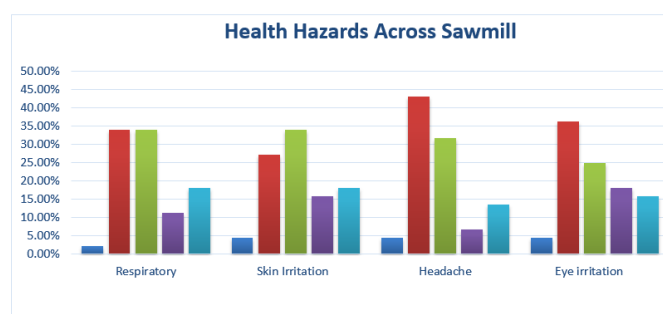
lent type of accident is minor cut 56.8% and 43.2% falls into the category of body injury accident.

**Tab. 3.** Safety practices and accident in Sawmill

Criteria	Variant	Frequency	Percentage (%)
Safety awareness	Yes	21	47.70%
	No	23	52.30%
PPE	Yes	18	40.90%
	No	26	59.10%
Use of PPE	Yes	15	34.10%
	No	29	65.90%
Lifting device	Yes	6	13.60%
	No	38	86.40%
Accident	Yes	20	45.50%
	No	24	54.60%
Accident types	Body injury	19	43.20%
	Minor cut	25	56.80%

**Health Hazards in the Sawmill**

The summary of health hazards for workers in the sawmill analysed using chi-square analysis revealed that most workers did not show any symptoms of respiratory-related problem in the sawmill, 2.3% of workers always complain of respiratory problem, 34.1% sometimes complain, 11.4% usually complain, 34.1% did not show symptoms and 18.2% rarely complain of respiratory problem. On the basis of headache, 4.5% of the workers always complain about a headache, 43.2% sometimes complain, 31.8% did not show symptoms, 6.8% usually complain, and 13.6% rarely complain of headache, For Skin irritation, 4.5% of the workers always complain of skin irritation, 27.3% sometimes complain, 34.1% did not show symptoms, 15.9% usually complain, 18.2% rarely complain of skin irritation and Eye irritation during the course of wood processing, 4.5% of the workers always complain of eye irritation, 36.4% sometimes complain, 25% did not show symptoms, 18.2% usually complain and 15.9% rarely complain of eye irritation. There is no significance difference in the health issues of the sawmill workers since all p values are greater than 0.05 (Fig.6).



**Fig. 6** Health Hazard across sawmill. **Note:** (■) Always; (■) Sometimes; (■) No symptoms; (■) Usually; (■) Rarely.

The nature of work being carried out in the sawmills makes the workers be prone to health hazards and accidents. It is reported that their findings that common hazard occurs in many industries, especially in the sawmill industry. It was observed that the majority of the workers sometimes complain of skin irritation. According to International Agency for Research on Cancer (IARC), certain types of wood dust, for example, can cause allergic reactions, and saw dust has been determined to be a group a carcinogen. The workers also complain about respiratory problems, eye irritation due to dust when processing wood, and headaches due to the high level of noise. Hence, noise is an important factor that affects the work environment because it has direct and indirect effects on the workers' health and efficiency (Owoyemi, et al, 2017; Fuwape, 1998; Akinbode, 2019). It was observed that the majority of the workers usually sustain minor cuts/injuries during wood processing. This confirmed Omobude-Idiado, who stated in their research that a man's occupation may influence his health (Omobude-Idiado, et al.,2013).

## CONCLUSION

Inadequate training programs on safety practices for workers in the sawmill industries especially both the medium and low-status sawmills have contributed to the negligence of the use of PPE to enhance safety measures. Little attention was given to safety practices in the sawmills showing that more still need to be done to ensure the safety and well-being of the workers. The lack of safety compliance among the sawmill employees calls for the attention of the management of sawmill industries and Government must monitor closely sawmill operations to safeguard the health of her citizens.

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