

Occupational hazards and health problems reported by workers in a Sawmill in Uyo, Nigeria

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ABSTRACT

Introduction: Sawmill workers in Nigeria are exposed to many workplace hazards and avoidable health problems. This study was carried out to determine the perceived hazards and health problems among workers in a sawmill in Uyo, Nigeria.

Materials and Methods: This was a cross-sectional descriptive study carried out in February 2018 among workers in a sawmill in Uyo. Information obtained using an interviewer-administered questionnaire included work history, occupational hazards, health problems, and use of personal protective equipment (PPE) among the wood workers. Data were analyzed with IBM SPSS Statistics 20 software. Inferences were made using the chi-square test. Level of significance was set at 0.05.

Result: A total of 127 respondents participated in the study. The mean age of respondents was 35.14 ± 11.38 years. A majority of 124 (97.6%) were males and 76 (59.8%) had completed secondary level of education. A majority of 92 (72.4%) worked for 8–10 hours daily and 54 (42.5%) had worked for >10 years. Occupational hazards reported were dust, 94 (74.0%), noise 93 (73.2%), vibration 62(48.8%), and heat 60 (47.2%). Health problems included injuries 54 (42.5%), low back pain 52 (40.9%), cough 45 (35.4%), and eye irritations 34 (26.8%). Cough was significantly associated with the number of work years ($p < 0.05$). The most commonly used PPEs were face masks 17 (13.4%) and goggles 13 (10.2%).

Conclusion: Despite the hazards and health problems reported by the workers, the use of PPE was poor. Legislation such as the Occupational Safety and Health Framework Directive which obliges employers to take appropriate preventive measures to make work safer and healthier should be enforced in all sawmills. Health and safety training and occupational health services should also be provided for sawmill workers to ensure a healthier workforce.

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Introduction

Wood processing activities involve various procedures which convert raw wood into usable forms. Work locations where such processing are carried out include sawmills, wood furniture industry, and door manufacturing industry [1]. A sawmill is a place where timbers are sawn into different sizes of planks or boards by a machine [2]. There are several hazards in the sawmill industry, one of which is dust. Wood dust refers to the tiny sized and powdery waste that occurs while processing wood [3]. It is estimated that at least 2 million people

are routinely exposed occupationally to wood dust worldwide [4]. Wood processing procedures such as sanding, cutting, or milling generate dust which might result in several health problems including carcinogenicity [4,5]. Evidence abounds of the carcinogenic effects of wood dust, particularly hardwood on the nasal cavity, paranasal sinus, and nasopharynx [6,7]. Many other respiratory symptoms common among wood workers as a result of dust inhalation include cough, breathlessness, eye irritation, sneezing, and rhinitis [8–11]. A study in Calabar, Nigeria reported respiratory symptoms

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such as cough, sneezing, and phlegm in 94% of the respondents [8] while a study in south-west Nigeria reported the prevalence of cough and sneezing of 60% and 54%, respectively [10]. In another study in south-eastern Nigeria, rhinitis was reported by 78% of the wood workers [11].

Apart from dust, other hazards reported among sawmill workers include unguarded moving parts of machinery, noise, and heat [9,12,13]. These could result in several health conditions such as injuries, deafness, and fatigue [13,14]. In a study among sawmill workers in Osogbo, Nigeria, 78% of the respondents reported having hand injuries in the recent past [14]. Also, the estimated noise pollution levels at three sawmill locations in a study in Delta State, Nigeria were far higher than the acceptable limits by National Institute of Occupational Safety and Health and Occupational Safety and Health Administration and the workers were reported to be at risk of noise-induced deafness [15].

Despite the hazards and health issues often encountered by workers in sawmills, low or non-usage of personal protective equipment (PPE) have been reported in several studies [10,12–14]. This may be due to poor awareness of occupational hazards and/or poor availability of the protective devices [12,16]. A study conducted in Ile Ife, Nigeria among sawmill workers reported poor awareness of the occupational hazards inherent in that occupation [16].

Many countries have legislation which ensure the health and safety of workers. One of such is the European Framework Directive (89/391/EEC) on occupational health and safety which makes it the obligation of the employers to ensure the safety and health of workers in every aspect related to work. This includes engaging all hierarchies of hazard control measures including provision of PPEs to workers [17].

Despite the availability of sawmills in Uyo with routine exposure of the workers to different hazards, no documented research has been carried out among this occupational group in this area. The objectives of this study, therefore, were to determine the perceived hazards and health problems reported among workers in a sawmill in Uyo. The researchers intend to give feedback on study findings to the employers and members of the sawmill association at the study location and subsequently offer periodic health education to this group of workers on the hazards associated with their occupation and the possible effects on health.

Materials and Methods

This quantitative study was carried out in February 2018 among workers in a sawmill in Uyo, a city in the southern part of Nigeria. Uyo is the capital of Akwa Ibom State with a projected population of 413,381 in 2015 [18]. It is a fast developing city. Apart from those in the civil service, there are a lot of workers in the informal sector. Sawmill workers belong to this sector. In Uyo, sawmills are currently located in the timber markets at Ifa Ikot Okpon and Itam. Each location has a timber market association.

This was a cross-sectional descriptive study. The sample size for this study was calculated using the formula for calculating single proportion for cross-sectional studies with a prevalence of 0.94 being the prevalence of respiratory symptoms among wood workers in a previous study [8], z of 1.96, sampling error of 5% and 10% overestimation to accommodate any non-response. A sample size of 96 was obtained which was rounded up to 100.

Wood workers in Uyo are found in clusters at the Itam and Ifa Ikot Okpon timber markets. Out of the two locations, the Ifa Ikot Okpon timber market location was selected for this study by simple random sampling method. At the time of the study, this location had 50 sheds each housing two wood processing machines. According to the chairman of the timber market association at that location, there are 138 registered members at the sawmill in Ifa Ikot Okpon timber market. All consenting workers in the sawmill who had been in continuous employment for a minimum of 6 months were included in the study. Those excluded were, therefore, workers who did not give consent and those who had worked for less than 6 months at the time of the study. Data collection was carried out using an interviewer-administered questionnaire designed by the authors which was pretested among wood workers at Itam park, about 10 km from the study location. The questionnaire considered the socio-demographic characteristics (age, sex, education, and income), work history (number of working years and daily hours of duty), hazards (heat, noise, dust, and vibration), health problems (musculoskeletal disorders, low back pain, cough, breathlessness, chest pain, chest tightness, sneezing, rashes, eye irritation, and injuries), awareness and use of PPE, and hygiene practices (hand washing, bathing, and changing of clothes at close of work) among the wood workers. Three resident doctors and four community health

Table 1. Socio-demographic characteristics of respondents.

Variable	Frequency (N = 127)	Percentage
Age		
≤20	8	6.3
21–30	47	37.0
31–40	40	31.5
>40	32	25.2
Range = 17–65 years		
Mean = 35.1 ± 11.4		
Sex		
Male	124	97.6
Female	3	2.4
Marital status		
Single	62	48.8
Married	64	50.4
Others	1	0.8
Highest educational level		
None	3	2.4
Primary	30	23.6
Secondary	76	59.8
Tertiary	18	14.2
Average monthly income (Naira)		
<20,000	64	50.4
21,000–40,000	35	27.6
41,000–60,000	6	4.7
61,000–80,000	6	4.7
>80,000	16	12.6
Work duration (years)		
<1	12	9.4
1–5	42	33.1
6–10	19	15.0
>10	54	42.5
Daily hours of duty		
<8	15	11.8
8–10	92	72.4
>10	20	15.8
Mean = 9.3 ± 1.5		

officers in training served as research assistants. The data collection process lasted for 3 days.

Data obtained were analyzed using IBM SPSS version 20 software. Descriptive and inferential statistics were utilized in data analysis. Univariate and bivariate analysis were done. Associations were tested using the chi-square test and results were presented in tables and a figure. Level of significance was set at 5%.

Ethical approval was obtained from the Akwa Ibom State Health Research Committee. Approval was also received from the chairman, Association of Wood Workers at the study location. The purpose and significance of the study were explained to the wood workers. Only those who gave informed consent were included in the study as participation was absolutely voluntary. No names were used in order to ensure confidentiality.

Table 2. Occupational hazards and health problems reported by respondents.

Variable	Frequency	Percentage
Inhalation of wood dust		
Yes	94	74.0
No	33	26.0
Noise		
Yes	93	73.2
No	34	26.8
Vibration during wood cutting		
Yes	62	48.8
No	65	51.2
Excessive heat		
Yes	60	47.2
No	67	52.8
Any health problem		
Yes	105	82.7
No	22	17.3
Injuries	54	42.5
Low back pain	52	40.9
Cough	45	35.4
Eye irritation	34	26.8
Sneezing	34	26.8
Musculoskeletal pain	29	22.8
Chest pain	23	18.1
Rashes	14	11.0
Chest tightness	11	8.7
Breathlessness	9	7.1
Phlegm	8	6.3

Results

A total of 127 out of 138 respondents participated in the study giving a response rate of 92.0%. The mean age of respondents was 35.1 ± 11.4 years. One hundred and twenty-four (97.6%) were males; 64 (50.4%) were married, and 76 (59.8%) had completed secondary level of education. Up to 54 (42.5%) had worked for >10 years. The average monthly income of 64 (50.4%) was <20,000 Naira. Ninety-two (72.4%) of the respondents worked for 8–10 hours daily (Table 1).

The commonest occupational hazards reported by the respondents were dust inhalation, 94 (74.0%) and noise 93 (73.2%). Vibration and excessive heat were also identified by 62 (48.8%) and 60 (47.2%) of the respondents, respectively. One hundred and five (82.7%) had experienced some health problems while at work such as injuries 54 (42.5%), low back pain 52 (40.9%), cough 45 (35.4%), and eye irritations 34 (26.8%) (Table 2).

Concerning PPE, 87 (68.5%) of the respondents were aware of any type of PPE, the commonest being face mask (42.5%) and goggles (37.0%). Only 43 (33.9%) reported using any form of PPE. The most commonly used were face mask 17 (13.4%) and goggles 13 (10.2%) (Table 3).

Table 3. Awareness and use of PPE among respondents.

Variable	Frequency	Percentage
Awareness of any PPE		
Yes	87	68.5
No	40	31.5
Awareness by types		
Face mask	54	42.5
Goggles	47	37.0
Shoes	44	34.6
Overall	47	37.0
Glove	36	28.3
Use of any PPE		
Yes	43	33.9
No	84	66.1
Use of PPE by types		
Face mask	17	13.4
Goggles	13	10.2
Shoes	10	7.9
Overall	18	14.2
Glove	12	9.4

A large proportion of the respondents reported changing clothes (92.9%), washing hands (85.0%), and having a shower (82.7%) daily at the close of work (Fig. 1).

There was a statistically significant association between working years and the occurrence of cough

among the respondents ($p = 0.001$). The symptom of cough was commonest among those who had worked for >10 years. Also, a higher proportion of those who reported exposure to dust had the symptom of cough compared to those who did not report such exposure. The association was, however, not statistically significant ($p = 0.12$) (Table 4).

Discussion

This study was carried out to determine the perceived hazards and health problems experienced by workers in a sawmill in Uyo, Nigeria. The mean age of respondents was 35.1 ± 11.4 years. Similar mean ages of 34.50 ± 11.01 years and 34.69 ± 9.91 years were reported in studies in south-west and south-south Nigeria, respectively [19,20]. This implies that generally, a significant proportion of sawmill workers are young people. In the present study, about 4 out of every 10 respondents were less than 30 years of age. In a similar study in Abakaliki, Nigeria up to 64.2% of the respondents were less than 30 years [13]. Moreover, respondents in another study reported commencing work in a sawmill at an early age of 13.5 years [21]. Many sawmill workers are,

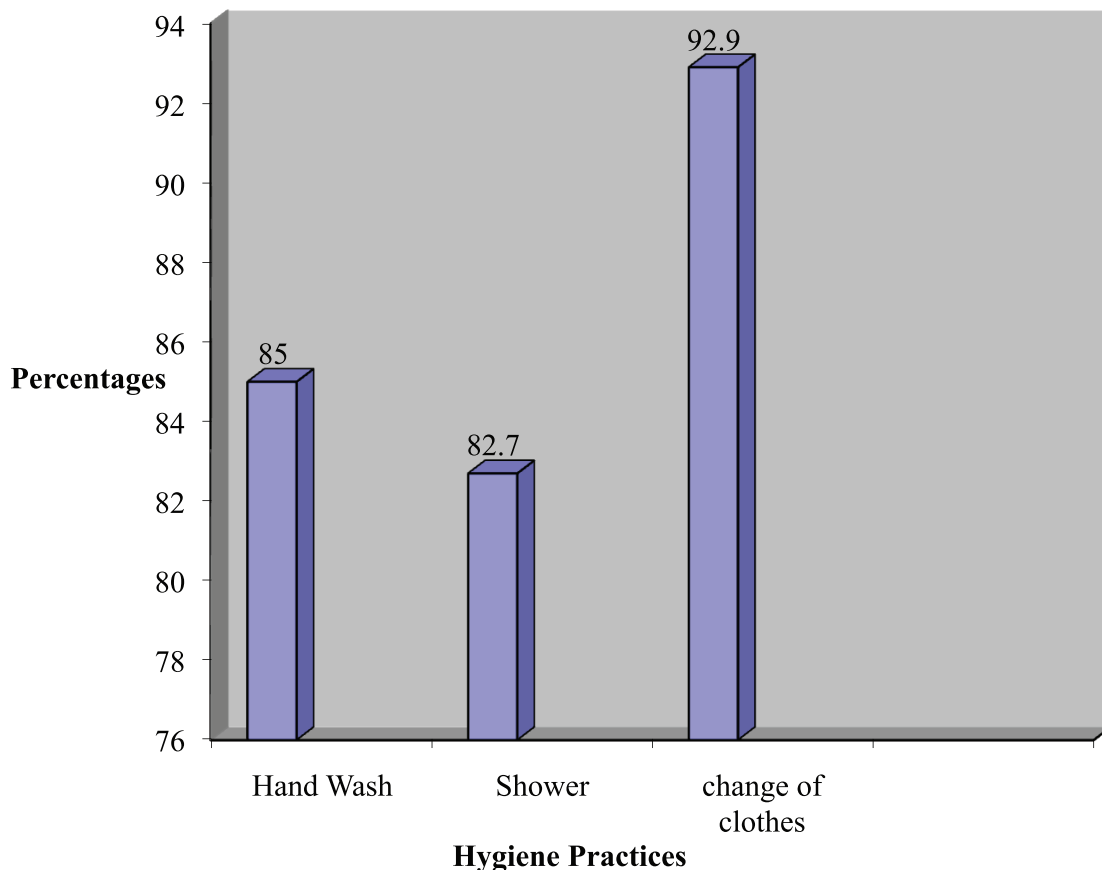


Figure 1. Hygiene practices among workers in a saw mill.

Table 4. Association between having cough and selected variables.

Variable	Cough		Statistics
	Yes (N = 45)	No (N = 82)	
Working years			
<1	4 (33.3)	8 (66.7)	Fishers exact = 0.001*
1–5	7 (16.7)	35 (83.3)	
6–10	5 (26.3)	14 (73.7)	
>10	29 (53.7)	25 (46.3)	
Work hours			
<8	7 (46.7)	8 (53.3)	$\chi^2 = 1.1$; p value = 0.58
8–10	32 (34.8)	60 (65.2)	
>10	6 (30.0)	14 (70.0)	
Use of mask			
Yes	6 (35.3)	11 (64.7)	$\chi^2 = 0.00$; p value = 0.99
No	39 (35.5)	71 (64.5)	
Inhalation of wood dust			
Yes	37 (39.4)	57 (60.6)	$\chi^2 = 2.4$; p value = 0.12
No	8 (24.2)	25 (75.8)	

*Statistically significant.

therefore, people in the prime of life who need to be protected from workplace hazards which could shorten their productive years. In the present study, there were also respondents who were up to 65 years old, which suggests that some of the sawmill workers possibly end up spending all of their working years in the sawmill; thus, increasing the period of exposure to workplace hazards.

Considering the strenuous nature of the different activities at sawmills, it was not surprising to find in the present study that the majority of the respondents were males. Activities such as sawing, sanding wood, and operating often achaieq equipment are less likely to be carried out by females due to the energy-sapping nature of such roles. Similar findings were also observed from studies in Ebonyi and Edo States in Nigeria where 93.1% and 98.3% of the respondents were males, respectively [13,20].

Almost three quarters of the respondents in the present study identified dust inhalation and noise as the main hazards of their work. This is to be expected as wood processing procedures such as sanding, cutting, or milling, which are noisy activities also generate a lot of dust. Similar findings were reported in studies in Ilorin and Edo state, Nigeria, respectively as more than three quarters of the sawmill workers reported the presence of much noise in their workplaces [9,20]. These findings were higher than those reported in a similar study in North Central Nigeria where the most perceived occupational hazards were also dust, 28.1% and noise, 26.1% [12]. Even though it was not mentioned, it is possible that the hazard control measures in the locations of the latter studies may have

been better than those in the studies mentioned earlier. Other studies have also identified airborne wood dust as the most prevalent occupational hazard in the wood industry [6,22]. Despite the reality of these hazards, desperate job seekers who are often post-secondary youths are more interested in getting the job than in worrying about the health effects of these hazards [23]. All operators of sawmills should be mandated to routinely check the dust and noise levels of the work environments to ensure that they comply with permissible limits. Exposure to dust could lead to several respiratory symptoms including carcinogenicity while high noise level could result in hearing loss. A study in Delta State, Nigeria reported that 56.6% of the sawmill workers in the three locations studied were at risk of noise-induced deafness due to exposure to noise levels which were far above the acceptable limits [15]. Measurements of the levels of the different hazards reported by the respondents in the present study will be the focus of a future study in order to compare with acceptable limits established by international organizations.

Though about two-thirds of the respondents in the present study were aware of at least a type of PPE, only one-third reported using any. This trend was consistent with the findings of similar studies in other parts of Nigeria [12,13]. Only about a 10th of the respondents in the present study reported using face masks and goggles, respectively and these were the commonest PPEs in use. No respondent reported using ear muffs despite the high level of noise identified by the majority of them. In a similar study in Ghana, only 16.67% of the respondents

reported the use of ear plugs [24]. This poor use may be because the health effects of a hazard such as noise take time to manifest and consequently the workers may not see the need to protect themselves against such noise. Poor use of PPE has been documented in several other studies. PPE uses of 0%, 15%, and 48.9% were reported in studies carried out in Osun, Kwara, and Edo States in Nigeria, respectively [12,19,20]. In the Osun State study, the workers were directly observed by the researchers and none of them was found using any PPE at the time of the study. This was more factual than the subjective reports of respondents in questionnaire-based studies. A study in Ghana among 300 sawmill workers also reported that they rarely or never used the different PPEs [25].

There is a need for employers to make PPE available for workers as part of their efforts at making the sawmill conducive for workers. This is because the poor remuneration of many of the workers can hardly meet their needs, thus, making PPE procurement hardly a priority. For instance, in the present study, the average monthly income of half of the respondents was less than 20,000 Naira (\$55.5). In addition to making PPEs available for the sawmill workers, it is important to ensure that they are appropriate in order to effectively control the different hazards being addressed.

Considering the dusty nature of the work environment in a sawmill, it was not surprising to note that cough and eye irritations were reported by about a third and a quarter of the respondents, respectively, in the present study. Efforts must be made to improve the utilization of face masks among sawmill workers to reduce the quantity of dust inhaled by them. Higher prevalence of cough of 46.7% and 60% were reported in similar studies in south-south and south-west Nigeria, respectively [13,26]. In the present study, the symptom of cough was significantly associated with working years being commonest among those who had worked for more than 10 years who constituted about 4 of every 10 respondents. A similar pattern was observed in a study among sawmill workers in Edo State, Nigeria where the presence of at least one respiratory symptom was significantly associated with the duration of work [26]. Such prolonged exposure could be detrimental as there is evidence of an association between exposure to a substantial amount of wood dust and lung cancer [26]. Agu et al in their study, however, reported no significant difference in respiratory symptoms between sawmill workers who had worked for 5 years or less

and those who had worked for 6 years and more. The researchers' explanation in that study was that the dust level that the workers were exposed to was probably not intense [13].

Many of the health problems reported in the present study were dust related. There was no evidence of any form of dust control mechanism at the study locations. A similar finding was reported in a study in south-western Nigeria [19]. Dust control in the wood industry is paramount. Simple dust suppression measures like wetting the environment can reduce the concentration of inhalable dust in the atmosphere of the sawdust industries.

Other health problems reported by 4 out of every 10 respondents in the present study were injuries and low back pain. A similar study reported 18.6% and 12.1% for injuries and low back pain, respectively, among wood workers [28]. Injuries could be due to the frequent use of sharp equipment and exposure to unguarded machine parts [15] while low back pain could arise from prolonged standing, repetitive/strenuous jobs, bending, and manual lifting of heavy logs of wood [29]. Also, almost three quarters of the respondents in the present study worked for 8–10 hour daily. This could have contributed to the occurrence of low back pain in addition to fatigue, reduced ability to concentrate, and increased proneness to accidents.

The hygiene practices reported by the workers in the present study were quite commendable as more than 8 out of every 10 respondents reported changing clothes, washing hands, and having a shower at the close of work. This was higher than findings of other studies among timber workers in south-south and south-eastern Nigeria, respectively, where 71.9% of the respondents did not wash their hands after work and 33.2% did not have a bath after working each day [20,28]. These hygiene practices help to reduce the quantity of dust on the bodies and clothes of sawmill workers as they go to their respective houses; thus, preventing exposure of household members to wood dust. For these hygiene practices to be effective, there must be an adequate supply of constant water and bathing facilities and these were available in the sawmill considered in the present study.

Conclusion

Sawmill workers in this study identified many hazards in their workplace. They also reported different health problems. Many of them were engaged in strenuous activities for 8–10 hours daily for several

years. Despite the hazards and health problems reported, use of PPE was poor. Measures must be put in place to ensure the safety and health of these workers.

Recommendations

Legislation such as the Occupational Safety and Health Framework Directive which obliges employers to take appropriate preventive measures to make work safer and healthier should be enforced in all sawmills in Nigeria. Sawmill workers should be educated on the need to use protective devices in the work environment. Occupational health services should also be made available to this group of workers to ensure a healthier work force.

Conflict of Interest

The authors declare that there is no conflict of interest associated with this study.

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