An Empirical Verification of Occupational Health Hazards on Sawmill Workers

*Yusuff, A.Q.

Adegbite, R. A.

Awotedu, O. L.

Akinosho, H. O.

Federal College of Forestry, Ibadan, Oyo state, Nigeria.
*Corresponding Author Email: yusadeq@yahoo.com

Abstract

The study investigates an empirical verification of occupational health hazards on sawmill workers at various sawmill within the Ibadan land local governments. The data were collected through the use of self-structured questionnaires majority closed-ended with few open-ended question was administered to 10 local government plank markets. Simple descriptive analysis such as respondents frequency and simple percentages were used to describe the socio-demographic characteristics of the respondents while regression analyses were employed to determine respondents health disorders experienced and other preventive measured by the sawmill worker. It was revealed that the average age for all respondents was 35 years, thus showing that majority of the respondent was in the middle age-categories. Result shown that 97.5% of the respondents are Male while the remaining 2.5% are Female, indicating that, it is men's job.56.25% had no formal education while 20%, 13.75% 7.5% and 2.5% had spiritual, primary, secondary and tertiary education respectively. Three variables were significant in influencing the level of occupational health hazards and disorders of the respondents. These are respondents health disorders experienced (p<0.01), years of experience (p<0.05) and educational level (p<0.1). The study discovered some health hazards and disorders associated with the sawmill work in Ibadan land. It was also discovered that wastes generated in the sawmill industries had a lot of effects on the health conditions of workers. The hazards and disorders need integrated approach in respect of prevention and control. Therefore, advices were given to the government, the factories and the communities in general.

Keywords: questionnaires, hazards, sawmill, ergonomics, regression analysis.

1. Introduction

It has been discovered for centuries that human occupation constitutes variety of hazards in one way or the other. Occupational health is essentially preventive medicine. For this reason, the joint International Labour Organisation / World Health Organisation (ILO/WHO) Committee on occupational health in the course of its session held in 1950 defined occupation health as aim to the promotion and maintenance of the highest degree of physical, mental and social well-being of the workers in all occupation, the prevention among workers of departures from health caused by their working conditions, the prevention of workers in their employment from risk resulting from factors adverse to health; the placing and maintenance of the workers adapted to his/her physiological and psychological requirement to sum up the adaptation of works to man and each man to his job. Occupational health is also the scientific study of interaction between man's occupation and his health.

Like any working environment, a sawmill is a facility where logs are cut into boards (timber).The basic operational mechanism is much like a hundred of years back; a log enters on one end dimensional lumber exits on the other end. Logging fells the trees, and log bucking cut them to length, logs are taken by trucks, trail or river to the sawmill. Logs are sealed either on the way to the mill or upon arrival at the mill. Debarking moves back from the logs. The head-saw (head rig) or primary saw, break the log into cunt (unfinished logs) and pitch with smooth edge. Depending upon the species and quality of the log, with cunt with either be further broken by a re-saw or gang edger into multiple pitches end/boards. Edging will take the fitch and trim off all irregular edges leaving four sides lumber to dry to remove moisture.

The idea developed from the water driven sawmill up to a modern reconstruction sawmill. Sawmill became widespread in medieval Europe in the year 1250AD and in Madeira 1420AD and widely in Europe in 16th century.

In addition, steam or petrol powered traction engines allowed the entire sawmill to be mobile. In the twenty century, the introduction of electricity and high technology furthered this process. Technology has changed sawmill operations significant in recent years, emphasising increasing profit through waste management and increase energy efficiency as well as improving operator safety.

In the past, it was customary to think of occupation health entirely in relation to factories and mines; hence the terms " industrial hygiene " or "industrial health " were in vogue. Modern concepts of occupational health now embrace all types of employment including mercantile and commercial enterprise, service trades, forestry and agriculture and include the subject of industrial hygiene, industrial disease, industrial accidents, toxicology in relation to industrial hazards, industrial rehabilitation and occupation psychology, occupational agriculture and ergonomics.

"The object of ergonomics is achieving the best through adjustment of man and his work, for the improvement of human deficiency and well being." The application of ergonomics has made a significant contribution to producing industrial accidents and to the overall health efficiency of the workers. The industrial revolution and the present capitalism, the desire to produce and sell products should not overshadow the freedom of safety and fundamental right to live and let live. The volume and physical properties of chemicals found in sawmill pose and wide range of health hazards, example is a wide range of adhesives and coating agent use in finishing wood product many are hazardous to the health of employees.

Similarly, poisonous plants as some trees pose poisonous substances in their roots e.g. position ivy, oak and sumac constitute health hazards. On the same vein, saw blades generate find dust containing cobalt in a silvery bluish-white, odourless and magnetic metal. The fume and dust of cobalt metal without proper or adequate ventilation over exposure is possible. This is combustible and burns brilliantly in the air of room temperature. It may form explosive in the air. The sharpness and sharp pointed end of some tools constitute accidents possibilities and many other hazards.

1.1 Classification of Occupational Health Hazards

In any tropical sawmill, occupational health hazards can be classified into four broad groups. These are:

Physical: It means things that can be seen, heard or touched e.g. noise, temperature, pressure, vibration, radiation, dust, poisonous substances and the refuse waste.

Biological: For grouping of living organism e.g. bacteria, virus, fungi, algae, protozoa helmintistics agent, pest and the parasitic organism.

Psycho-social: It results from human mind and his social setup e.g. tension, stress, fatigue, lack of motivation and human relation, etc.

Ergonomics: Proper installation of machines, manpower development and right tool for the right worker approaches.

2. Material and Methods

2.1 Study Area:

The study was carry out among the workers at the various sawmill within the Ibadan land local governments. As the capital city of Oyo state, it consists of 11 local government areas namely: Ibadan South West, Ibadan North West, Ibadan North East, Ibadan South East, Ibadan North, Ido, Egbeda, Oluyole, Akinyele and Ona Ara while Lagelu were used to test the reliability of the research.

2.2 Sampling procedure and sample size:

A self-structured questionnaire majority closed ended with few open-ended question was administered. Simple random sampling technique was used to select sample respondents from these markets. A total of eight hundred (800) respondents were selected. Eighty (80) respondents from each local government plank market. This allows the study findings to be generalised to a larger population.

3. Data Analysis

Simple descriptive statistics such as frequency countable and percentages were used and inferential statistics of multiple

regression analysis to test for the hypothesis at 1%, 5% and 10% level of significant.

3.1 Multiple Regression Analysis

The implicit form of the model is given by: $Y = f(X_1, X_2, X_3, X_4, X_5, X_6)$ where

Y = Level of Occupational health hazards and disorders of the respondents
X_1 = Age of sawmill workers in years
X_2 = Sex of sawmill workers (O for male, 1 for female)
X_3 = Religion of the sawmill workers (O for Islam, 1 for Christianity, 2 for Traditional and 3 for others)
X_4 = Tribe of the sawmill workers (O for Yoruba, 1 for Igbo, 2 for Hausa and 3 for others)
X_5 = Qualification/Educational level of sawmill workers in years
X_6 = Year of experience
X_7 = Respondents health disorders experienced
X_8 = Other preventive measures by the sawmill workers

Linear, Semi-log and double-log functions were tried out. The double – log function was found to have conformed to the *a priori* expectation, it was also the most appropriate in terms of both statistical and economic criteria. The explicit form of the three models is as follows:

Linear: $Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + \ldots + B_8X_8$ ---------- (1)
Semi-log: $Y = B_0 + B_1\ln X_1 + B_2\ln X_2 + B_3\ln X_3 + \ldots + B_8\ln X_8 + e$ ---------- (2)
Double-log: $\ln Y = B_0 + B_1\ln X_1 + B_2\ln X_2 + B_3\ln X_3 + \ldots + B_8\ln X_8 + e$ -------- (3)
A priori (expectation)

All the variables except respondents health disorders experienced and other preventive measures by the sawmill workers are expected to carry a positive sign. Thus, as these variables increase, occupational health hazard and disorders would also increase. For the variables that are expected to carry a negative sign, an increase in these variables would result in a decrease in occupational health hazard and disorders.

4.   Results and Discussions

4.1 Socio-demographic characteristics of the respondents.

Table 1 revealed that the respondents were in ages 15-20,21-25,26-30,31-35 and 36 & above representing 12.5%,13.75%,16.25%,25% and 32.5% respectively. Average age for all the respondents was 35 years, thus showing that majority of the respondents was in the middle age categories. Married respondents were 83.75% while the remaining 16.25% were single, divorced and separated. It also reveals that 97.5% of the respondents are male while the remaining 2.5% are female, thus showing that the job is specially meant for men. On educational status, 56.25% had no formal education while 20%, 13.75%, 7.5% and 2.5% representing religious/spiritual, primary, secondary and tertiary education respectively which indicates that majority of the respondents had no opportunity to obtain formal education. The table indicates that the respondents have a long exposure to sawmill hazards. On religion, 50% are Muslims, 37.5% are Christians, and 12.5% are traditional religion and others. Finally, it was revealed that 12.5% are for other tribes apart from Yoruba. This was as a result that the location is Yoruba land.

Table 1: Socio-demographic characteristics of respondents.

Socio-demographic Characteristics	Frequency	Percentage %
AGE (YRS)		
15 – 20	100	12.5
21 – 25	110	13.75
26 – 30	130	16.25
31 – 35	200	25
36 & Above	260	32.5
Total	**800**	**100**
SEX		
Male	780	97.5
Female	20	2.5
Total	**800**	**100**
RELIGION		
Islam	400	50
Christianity	300	37.5
Traditional	60	7.5
Others	40	5
Total	**800**	**100**
TRIBE		
Yoruba	700	87.5
Igbo	50	6.25
Hausa	30	3.75
Others	20	2.5
Total	**800**	**100**
QUALIFICATION		
Non-Formal	450	56.25
Spiritual or Religious	160	20
Primary	110	13.75
Secondary	60	7.5
Tertiary	20	2.5
Total	**800**	**100**
EXPERIENCE (YRS)		
5 – 10	380	47.5
10 – 15	290	36.25
15 – 20	100	12.5
Above 20 years	30	3.75
Total	**800**	**100**
MARITAL STATUS		
Single	90	11.25
Married	670	83.75
Divorced	20	2.5
Separated	20	2.5
Total	**800**	**100**

Table 2a tries to relate the variables with the research question. On the investigation whether there is any relationship between work and health, 92.5% respondents agreed. On the type of health hazards associated with the sawmill business, 82.5% accepted that the hazards is physical while 7.5%, and 2.5% accepted it was biological and social hazards respectively. The remaining 7.5% did not agree that these hazards are co-ordinated to their working environment. To identify the working condition with health related hazards, 37.5% agreed, 7.5% did not agree and 55% were undesired. The investigation of the nature and characteristics of health hazards, 37.5% related their work with variety of diseases, 25% contagious, 7.5% allergic, 5% vector bone diseases while 62.5% were unknown.

To dig down the roots of conditions experience during years of service in the sawmill and subsequently, the summary results is given on health condition (Table 2b). Therefore, 37.5% had positive answer while 62.5% had answered negatively on their experience with some health disorders in their course of duties. Also, 21.25% agreed that the disorders were regular while 16.25% agreed that their experience with health hazards was occasional.

Table 2a: Health hazards and disorders

S/N	Variables		Respondents	Percentage
1.	Do you think your work has health related hazards	Yes	740	92.5
		No	60	7.5
		Total	**800**	**100**
2.	If yes, what type of health hazards mention?	Physical	660	82.5
		Biological	60	7.5
		Social	20	2.5
		Unknown	60	7.5
		Total	**800**	**100**
3.	Do you think this work has health related hazards?	Yes	300	37.5
		No	60	7.5
		Unknown	440	55
		Total	**800**	**100**

4.	If yes, what type of health hazards?	Contagious	200	25
		Allergic	60	7.5
		Vector borne	40	5
		Unknown	500	62.5
		Total	**800**	**100**

Table 2b:

S/N	Health condition	Yes	No	Regularly	Occasional
a.	Accidents/cuts	20	40		√
b.	Falls		20		
c.	Irritation/disorder of the eye	80	30	√	
d.	Nose and throat infection	90		√	
e.	Tiredness and headache		60		√
f.	Skin disorder	30	40		√
g.	Heart problems		70		
h.	Impaired hearing		20		
i.	Deafness		100		
j.	White fingers and numbness				
k.	Asthma	40	60		√
l.	Sleeplessness		20		
m.	Any other illness	40	40		√
	Total	**300**	**500**	**2**	**5**

Question	Variable	Respondents	Percentage
Do you think these conditions (Health) are cause by or related to your work?	Yes	300	37.5
	No	500	62.5
Total		**800**	**100**

On the preventive measures taken either by the government or the factory owner, it has been discovered that the measures taken are not adequate to safeguard the workforce to optimum health as presented in table 3 and table 4.

Table 3: Accident prevention equipment available

S/N	Equipment	Yes	No	Unknown	Regular	Percentage		
						Yes	No	Unknown
1.	Face mask	20	30	750		2.5	3.75	93.75
2.	Eye shield	-	-	-				-
3.	Hand gloves	-	50	750			6.25	93.75
4.	Protective garments	150	200	450	√	18.75	25	56.25
5.	Booth & foot wears	40	10	750	√	5	1.25	93.75
	Total	**210**	**290**			**26.25**	**36.25**	

Table 4: Government effort towards accident prevention on sawmill working environment

S/N	Variables		Respondents	Percentage
1.	Has the government ever given any equipment/services to prevent accidents in your workplace?	Yes	200	25
		No	300	37.5
		I don't know	300	37.5
		Total	**800**	**100**
2.	If yes, mention?	Equipments	20	2.5
		Health education	160	20.5
		Work shop	20	2.5
		Unspecified	600	7.5
		Total	**800**	**100**
3.	As any Non-governmental organisation provided any equipments/services to prevent accidents in this workplace?	Equipments	0	0
		Health education	130	16.25
		Workshop	320	40
		Unspecified	350	43.75
		Total	**800**	**100**
4.	Is there any accident prevention service	Yes	0	0

E-ISSN 2281-4612
ISSN 2281-3993

Academic Journal of Interdisciplinary Studies
MCSER Publishing, Rome-Italy

Vol 3 No 6
November 2014

	available to workers in this place provided by the workers union?	No	300	37.5
		I don't know	500	62.5
		Total	**800**	**100**
5.	What measures are used to take care of accidents and health problems among workers?	a. Visit health centre	160	20
		b. Visit government hospital	260	32.5
		c. Visit private hospital	160	20
		d. Traditional probationers	120	15
		e. Medicine vendors	10	1.25
		f. Nothing done	0	0
		g. Other specify	90	11.25
		Total	**800**	**100**

4.2 Regression Analysis

The result of the regression analysis is presented in Table 5. From the table Age, Marital status, Educational level/Qualification and Years of experience were positively related to the Level of occupational health hazards and disorders. Other variables that carried the expected positive sign include Sex and Tribes. The positive relationship of Sex to Level of occupational health hazards and disorders shows that Male sawmill workers are more prone to the risk than their Female counterparts. In the same vein, more Muslim participated than any other religion. It was also discovered that the higher the size of Yoruba, the higher the level of occupational health hazards and disorders to them. This is expected given the fact that the decrease the people's participation in sawmill activities. Thus, the negative sign carried by these variables (Respondents health disorders experienced and other preventive measures) shows that the higher the Respondents health order experienced and other preventive measures, the lower the Level of occupational health hazards and disorders of the sawmill workers.

Three variables were, however, significant in influencing the level of occupational health hazards and disorders of the respondents. These are respondents health disorders experienced ($p<0.01$), years of experience ($p<0.05$) and educational level ($p<0.1$). The R^2 value of 97.5% was high suggesting that the variation in the dependent variable is well explained by the independent variables. Also, F-value of 47.49 at $p<0.01$ showed that the model has a good fit.

Table 5: Result of Regression Analyses.

Variable	Co-efficient	Standard error	t-values	Level of Significance
Constant	0.3875	0.1410	2.748	0.0024***
Age	0.9321	0.8584	1.086	0.2109
Sex	0.7442	0.6124	1.2152	0.602
Religion	0.1289	0.0588	2.1922	0.212
Tribe	0.1125	0.2203	0.5107	0.629
Qualification	0.1582	0.0812	1.9483	0.095*
Experience (Years)	0.7552	0.3041	2.4834	0.024**
Respondents health disorders experienced	-0.8447	0.2002	-4.2193	0.000***
Other preventive measures by the sawmill worker	-0.4868	0.1706	-2.8535	0.0019***

$R^2 = 97.5$, F = 47.49 at $p<0.01$.
***Significant at 1%, **Significant at 5%, *Significant at 10%.

5. Conclusion and Recommendation

It was discovered that there are some health hazards and disorders associated with the sawmill work in Ibadan land. Since, sawmill by nature generate a lot of wastes, sawdust, wood off cuts, wood backs, plain shaving, wood reject, etc. with poor management, these waste poses great danger to the workforce and their immediate environment. Waste generation is concomitant aspect of living; it cannot vanish but can only be managed (Oluwagbemi 2010).
In view of the above, the hazards and disorders need integrated approach in respect of prevention and control. It was also discovered that waste generated in the sawmill industries had a lot of effects on the health conditions of workers and therefore the following recommendations are made:

Government
- They should make laws and enforce the laws so that health hazards are controlled in sawmill factories
- They should make regular environmental assessment which should be carried out in such industries and the

E-ISSN 2281-4612
ISSN 2281-3993

Academic Journal of Interdisciplinary Studies
MCSER Publishing, Rome-Italy

Vol 3 No 6
November 2014

newly proposed sites before commencing commercial activities.
- They should assign one agency to be responsible for sawmill inspection and laid down regulation.
- They should intensify the training of environmental health worker to monitor such factories accordingly
- They should mandate factories to make use of modern protective clothes and other gadgets in sawmill factories

Factories
- They should reduce at source waste generation to reduce the danger of waste improper disposal.
- They should employ ergonomics on proper placement of workers.
- They should employ modern incineration or readable method of waste disposal.
- They should regularly maintain their tools to avoid accidents during working time.
- They should be relocated far away from residential areas.

Community
- Community members should be warned not to be building houses near such factories
- The community should form health based team which will wash all pollutants
- Community member should inform the government about any suspected activities within their vicinity.

6. Acknowledgement

References

Adetokunbo, O. et al (2003). Short Textbook of Public Health Medicine for the Tropics. U.K. London: Hodder Education.
Aibor, M. S.and Olorunda, J.O. (2006). Technical Handbook of Environmental Health in the 21st Century for Professionals and Students. Akure: Mercy Publishers.
Akpa, G. O.and Udoh, S.U. (2002). Environment Education for Sustainable Development, Focus on Nigeria. Jos: Fab Anach Nig. Ltd.
FRIN (2009). Journal of Forestry Research and Management, Forestry Research Institute Of Nigeria, Jericho hill, Ibadan: Volume 6: pp1-9.
Jain, R. K. and Rao Sunil, S. (2009). Industrial Safety Health and Environmental Management Systems. India: Khanna Publishers.
Kleinbaun, D.G. and Kupper, L. L. (1978). Applied regression analysis and other multivariate methods. Boston: Duxbury.
Munro, B. H. and Page, E.B. (1993). Statistical Methods for Health Care Research. J.B. Hippincott Company. Philadelphia: 2nd ed., 403pp.
Oluwagbemi, B.F. (2003). Themes and Issues in Occupational Health and Safety. Ibadan: Hure Prints (Printers and Publishers).
Oluwagbemi, B.F. (2010). Basic Occupational Health and Safety. Ibadan: Vertext Media Ltd.
Osanyingbemi, B.F. (1987). Basic Occupational Health. Ibadan: Educational Services Limited.
Park K. (2009). Textbook of Preventive Medicine. India: Prem Nagar, Jabalpur, Banarsidas Publishers.
Unuraye, L.O. and Olojoba, A.O. (2005). Occupational Safety and Environmental Helath Management . Second Edition. Ughelli: Aina Ohoror Printing Press Coy.