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Health Problems among Users of Wood Coating in Selected Wood Workshop in Ibadan Metropolis

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Abstract

The health and safety of furniture makers are influenced not only by climate and biological agents like *bacteria, virus but also by the potential presence of air pollutants through emission from wood coatings and this hazards subsequent lead to health problems. This study was therefore carried out to assess health problems among the users of wood coating in selected wood workshop in Ibadan metropolis. A cross-sectional survey, which employed questionnaire and on-site observation, was used. Samples of 83 respondents were purposively selected among the user of wood coatings comprising mixtures of active furniture makers and carpenters in Ibadan metropolis.Data were analyzed using descriptive statistics such as percentages, frequency and chi square. The most predominant age group was 30-39 years (38.6 %) which were mostly young male (97.7 %) and 86.7 % of the respondents were married. While 41 % of the respondent had worked more than a decade and had stayed more than 6 hour (84.3 %) per day in their workplace. Most (75.9 %) of the respondents were aware of the Personal Protective Equipment (PPE)with occasionally usage (46.98). Eye goggle (27.94 %) was the most frequently used followed by nose cover (27.45 %) and workshop apron (23.52 %). The reasons for non usage attributed to the dislike of PPE by the respondents (30.12 %) and inconveniencing (33.73 %)that PPE imposed on the users. However, 32.53 % had ever developed any health condition while 37.35 % perceived deterioration in their health status and 33.73 % of the respondent developed any respiratory symptoms while working. Therefore, the most frequently reported respiratory symptoms were cough (24.09 %), wheeze (22.89 %), shortness of breath (16.86 %), chest pain (15.66 %), and chest tightness (12.05 %).Exposure to wood coatings has significant effect on respiratory symptoms among users of wood coatings indicating that workplacewas not safety compliant.*

Keywords: Wood coatings, Wood workshop, volatile organic compound, health problems

Introduction

Solid wood furniture is popular in the residences of the middle- and upper-class in Nigeria because of its durability and aesthetics. Meijer (2001) reported that to embellish and protect solid wood products, wood finishing and coating are usually applied during the manufacturing process. These wood finishes include wax, shellac, lacquers, varnishes, paints, etc. The selection is dependent on product-utilized purposes as well as aesthetic considerations. However, wood finishing involves exposure of workers and user of the finished products to Volatile Organic Compounds (VOCs) (Maneerat and Chaloemchai, 2014).

VOCs are considered air pollutants, and the amount that can be released for a given amount of solids is now regulated in many areas. The risk of health effects from inhaling any chemical depends on how much is in the air, how long and how often a person breathes it in. Breathing low levels of VOCs for long periods of time may increase some people's risk of health problems. Several studies suggest that exposure to VOC's may make symptoms worse for people with asthma or who are particularly sensitive to chemicals (MDH, 2015).These are much different exposure than occupational exposures. It is important to remember that VOCs refer to a group of chemicals. Each chemical has its own toxicity and potential for health effects.World Health Organization

(WHO 1985), explained that some of the risks associated with factory workers are industrial poisons, radiation, hyperbaric, noise, psychosocial stress and physical injuries. Cherry (2001) stressed that when workers are not provided with safety gadgets, they are exposed to health hazards.Consequently, formaldehyde emission is a never-ending process as this substance is continuously generated inside panels. On the contrary, the emission of other volatile organic compounds is the process tending to decrease and terminate during time, as they are not produced inside the materials. Such emissions are mainly due to coatings applied to the surfaces of walls, floorings, doors, furniture and so on (Bulian and Fragassa, 2016).

The furniture/carpentry industry in Ibadan is made up of several small scale privately owned industries with no safety monitoring, unprotected by Occupational Health legislation and not covered by Occupational Health Services. Recently, in many part of the world, work on risk assessment, occupational hazard had already done on sawmill but there are little or no information on occupational hazard awareness and safety measure by furniture/carpentry workers as regards their exposure to different wood coatings. Ibadan is known to have a higher number of user of wood and producer of finished wood products; hence this research is important and compulsory.

Methodology

This study uses a cross-sectional survey with respondents drawn from among user of wood coating in Ibadan Metropolis. The population of the study consisted of furniture/carpentry workshop in Ibadan, 83 respondents were sampled consisting of 8 major areas in Ibadan Metropolis. These respondents were selected using purposively sampling techniques (PST)A structured questionnaire was used to collect data on the health problems of wood coating users. The questionnaire contained four Sections, section A of the questionnaire dealt with the socio-demographic characteristics of respondents, section B consisted of work characteristics, section C elicited information regarding the awareness and use of personal protective equipment and reason for use while section D indicates respondents occupational health problems. The questionnaire was validated by experts review. Data collected were coded and analyzed using descriptive statistics such as percentages, frequency and inferential statistic of Chi-Square. Inferences were made at $\alpha_{0.05.}$

Results and Discussion

Demographic and Job Characteristics of User of Wood Coating

The information on socio-demographic characteristics of the users of wood coating are presented in Table 1. Age group 30 – 39 years was the most predominant (38.6 %) indicating that most of the users of wood coating (respondents) were predominantly young male (97.7 %) who are married (86.7 %). The predominance of male may be attributed to the high level of physical manual labor and technicality required in operating wood coating machine likewise the kind expertise required while using manure coating. However, the predominance of the respondents that were married male inferred that most of the respondents were saddled with one or more responsibilities which made their level of commitment higher. About half of the respondents (44.6 %) had secondary school education which inferred that acquiring formal education could enhance the productivity of the workers. Only 53 % of the respondents had received technical training for the job which indicated that technical training received by respondents would also enhances technological inclined practice and good-work delivery while 41 % of the respondent had worked more than a decade staying more than 6 hour (84.3 %) per day in their workplace. This is a pointer to the fact that more reliable information must have been gotten from them due to their long years of experiences as they are capable of judging rightly on workplace health problem.

Table 1: Socio-demographic and job characteristics of user of wood coating

Variables	Frequency N = 83	Percentage
Age		
<20	7	8.4
20-29	14	16.9
30-39	32	38.6
40-49	27	32.5
50-59	3	3.6
Gender		
Male	81	97.6
Female	2	2.4
Marital Status		
Married	72	86.7
Separated	1	1.2
Divorce	2	2.4
Single	8	9.6
Level of Education		
No formal education	9	10.8
Primary education	21	25.3
Secondary education	37	44.6
Tertiary education	15	18.1
No response	1	1.2
Received any technical training		
Yes	44	53
No	39	47
Number of years worked in the workshop		
1	2	2.4
2-5	23	27.7
6-10	24	28.9
11-15	13	15.7
>15	19	22.9
No Response	2	2.4
Hours at work per day		
3-5	3	3.6
6-7	70	84.3
8-10	5	6
>10	4	4.8
No Response	1	1.2

Awareness and Attitude to Personal Protective Equipments (PPE)

Awareness and attitude to personal protective equipments (PPE) among wood coating users was presented in Table 2, This study revealed thatmore than half (75.90 %) of the respondents were aware of the use of PPE while some of the respondents used PPE regularly (44.58 %), occasionally (46.98), and rarely/sometime (8.43). As indicated by the respondents, types of the PPE used include hand glove (26.96 %), workshop apron (23.52 %), nose cover (27.45 %) and eye goggle (27.94 %). The reasons for non usage of the PPE by the surveyed respondents can be attributed to the dislike of PPE by the respondents (30.12 %) and inconveniencing that PPE imposed on the users (33.73 %). However, non usage of PPE by the respondent can contribute to their exposure to the elevated levels of hazardous chemicals, during application of painting or coating or varnishing.When necessary, workers should have adequate protective materials to prevent toxic chemicals contact with the skin, eyes, or via inhalation (US OSHA, 2003).

Table 2:Awareness and Attitude to Personal Protective Equipments (PPE) among woodcoating User

Use of PPE	**Frequency (%) N = 83**
Aware of PPE	
Yes	63(75.90)
No	20(24.09)
Frequency of use	
Regularly	37(44.58)
Occasionally	39(46.98)
Rarely/Sometime	7(8.43)
Types used*	
Hand glove	55(26.96)
Apron	48(23.52)
Nose Cover	56(27.45)
Eye Goggle	57(27.94)
Reason for non-use	
Don't know how to use	8(9.63)
Dislike PPE	25(30.12)
Expense to purchase	8(9.64)
Not aware of PPE	8(9.64)
Slow down speed of work	3(3.61)
Inconveniencing	28(33.73)
Non availability	3(3.61)

Occupational Health Problems Associated User of Wood Finish

The results shows that 32.53 % of the respondents never developed any health condition, 37.35 % perceived deterioration in their health status while working and 33.73 % of the respondent developed respiratory symptoms while working. This implies that the presences of Volatile Organic Compounds (VOCs) in wood coatings contribute to the risk of health from inhaling any chemical which depends on how much is in the air, how long and how often a person breathes it in. This is in line with the report from MDH, 2015which

stated that breathing low levels of VOCs for long periods of time may increase some people's risk of health problems. Several studies suggest that exposure to VOC's may make symptoms worse for people particularly asthma or who are particularly sensitive to chemicals (Molhave, 1986; Kjaergaard*et al.,* 1991; Koren and Devlin, 1992; Yoon *et al.,* 2010; Sulaiman and Mohamed, 2011;DD, 2015).

In addition, Table 3 shows that the most frequently reported respiratory symptoms were cough (24.09 %), wheeze (22.89 %), shortness of breath (16.86 %), chest pain (15.66 %), chest tightness (12.05 %). Other conditions reported were difficulty in breathing (3.61 %), dyspnoea (2.41 %), and recurrent chest infection (2.41 %) while no report of sputum production by the respondents. The American Lung Association reports that VOCs and their byproducts can produce a number of physical problems, including eye and skin irritation, lung and breathing problems, headaches, nausea, muscle weakness, and liver and kidney damage (CGS, 2005).

The relationship between respiratory symptoms and duration of exposure at workshop or number of years worked at the workshop shows that a significant difference existed between respiratory system and the number years worked in the workshop with chi-square = 45.56*, df = 8 and P-level = 0.035. Majority of those that work five (5) or less experiences the respiratory symptoms through the use of wood coatings. This indicates that their involvement in their workplace without safety gadget and the level of engagement in the types of work warrant the occurrence of respiratory symptoms. Moreover, occupational hazards are globally a major cause of disability and mortality among working population when workers are not provided with safety gadgets, they are exposed to health hazards. This is line with the study conducted by WHO, 1997; Cherry, 2001 and SN, 2003.

Table 3: Occupational Health Problems in Respondents

Variables/Factors	**Frequency (%) N = 83**
Ever developed any health condition	
Yes	27(32.53)
No	47(56.62)
Don't know	8(9.63)
Total	82(98.79)
No Response	1(1.20)
Perceived deterioration in your health status	
Yes	31(37.35)
No	52(62.64)
Develop any respiratory symptoms while working	
Yes	28(33.73)
No	52(62.65)
Total	80(96.38)
No Response	3.61
Respiratory Symptoms	
Cough	20(24.09)
Chest Pain	13(15.66)
Sputum Production	0(0)
Shortness of Breath	14(16.86)

Dyspnoea	2(2.41)
Wheeze	19(22.89)
Chest Tightness	10(12.05)
Recurrent Chest Infection	2(2.41)
Difficulty in Breathing	3(3.61)

Table 4: Relationship between respiratory symptoms and duration of exposure at workshop

Respiratory Symptoms	Work 5 years or less N = 56	Work 6 years or more N = 27	Chi- Square (p-value)
Cough	12(25)	8(45.49)	45.56(0.035)
Chest Pain	9(18.75)	4(22.74)	
Sputum Production	0(0)	0(0)	
Shortness of Breath	8(16.67)	6(36.11)	
Dyspnoea	1(2.08)	1(5.68)	
Wheeze	11(22.91)	8(45.48)	
Chest Tightness	5(10.41)	5(28.42)	
Recurrent Chest Infection	1(2.08)	1(5.68)	
Difficulty in Breathing	1(2.08)	2(11.37)	

Conclusion and Recommendation

The result from this work shows that exposure to wood coatings has significant effect on respiratory symptoms among users of wood coatings in furniture/carpentry in Ibadan Metropolis. These brought about five most prevalent respiratory symptoms which werecough, wheeze, shortness of breath, chest pain, chest tightness. While it is necessary that workers should have adequate protective materials to prevent toxic chemicals from wood coatings as workplace was not safety compliant. Government should undertake regular and sustainable occupational health services and institute integrated workplace control of hazards/exposures both in small and large scale furniture/carpentry industries in Ibadan.

References

Bosan, I.B., andJ.U. Okpapi, .J.U.,(2004). "Respiratory symptoms and ventilatory function impairment among wood workers in the Savanna belt of Northern Nigeria." *Annals of African Medicine*" 3, 22-27.

Cherry, N., (2001). Handymen risk low sperm count. *Journal of Occupational and Environmental Medicine.* 14.

Choose Green Report (2005). Wood Finishes and Stains. Green Seal's. Pp 1-8

Dustless Duct (2015). Indoor Air quality. *An informational eguide.* Air Duct Cleaning and HVAC Maintenance. P 5.

Fragassa, C., and Bulian, F., (2016). VOC Emissions From Wood Products and Furniture: A Survey About Legislation, Standards and Measures Referred to Different Materials. Vol. 44, No 4, 358-364.

Kjaergaard, S.K., Molhave, L., and Pedersen, O.F., (1991). Human reactions to a mixture of indoor air volatile organic compounds. *Atmospheric Environ,* Vol. 25, pp. 1417-1426.

Koren, H.S., and Devlin, R.B., (1992). Human upper respiratory tract responses to inhaled pollutants with emphasis on nasal lavage. *Annals New York Academy of Science,* Vol. 641, pp. 215-224.

Maneerat, O.and Chaloemchai, M. (2014). Characterization of Total Volatile Organic Compound Emissions from Finished Solid Wood Using an Environmental Chamber. *EnvironmentAsia*7(1); 1-7.

Meijer, M.,(2001).Review on the durability of exterior wood coatings with reduced VOC content. *Progress in Organic Coatings.*43: 217-25.

Minnesota Department of Health (2015). Bulletin on Indoor Air Unit Pg. 1.

Molhave, L., Back, B., and Pedersen, O.F. (1986). Human reactions to low concentrations of volatile organic compounds. *Environmental International,* Vol. 12, pp. 167-175.

Safety in Numbers (2003). Pointers for global safety culture at work. International Labour Organization. Geneva, Available from: URL: http://www.ilo.org/public/english/region/eurpro/moscow/areas/safety/docs/safety_in_numbers_en.pdf.

Sulaiman, Z., and Mohamed, M., (2011). Indoor air quality and sick building syndrome study at two selected libraries in Johor Bahru, Malaysia. *EnvironmentAsia.* 4: 67-74.

US OSHA (2003). United States (US) Department of Labor Bureau of Labor Statistics (BLS). 2003. Occupational Injuries and Illnesses (Annual). Incidence rates of nonfatal occupational injuries and illnesses by industry and case types 2003-2005. Available at http://www.bls.gov/news.release/osh.t07.htm

World Health Organisation (1985) “Expert Committee Report on Occupational Health”

World Health Organisation (1997) “Health and Sustainable Development.” Geneva: WH.

Yoon, H.I., Hong, Y.C., Cho, S.H., Kim, H., Kim, Y.H., and Sohn, J.R., (2010). Exposure to volatile organic compounds and loss of pulmonary function in the elderly. *Eur Respir J.* 36(6):1270–1276. [PubMed: 20351028]