IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)
e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 10, Issue 7 Ver. II (July 2016), PP 72-76
www.iosrjournals.org

Occupational Hazards among Workers in Petroleum-Allied Industries in Nigeria: A Case study

Chineke HN [1], Adogu POU*[2], Egenti NB[3], Ezemenahi BE[4],Egwuatu CC[5],
[1]*Department of Family Medicine, Imo State University Teaching Hospital Orlu, Nigeria*
[2]*Department of Community Medicine, NnamdiAzikiwe University Awka, Nigeria*
[3]*Department of Community Medicine, University of Abuja, Nigeria*
[4]*Department of Family Medicine, Federal Medical Centre,Asaba.*
[5]*Department of Medical Microbiology, NnamdiAzikiweUniversityAwka, Nigeria*
***Dr Prosper OU Adogu**

Abstract:
Background Objective:*Occupational health deals with the sum total of all activities, adverse effects and problems that are usually encountered by the workers in their environment. Petroleum, Oil and Gas workers are usually faced with a lot of health hazards in their workplace. This study evaluates the prevalence of occupational health hazards among workers in a medium scalepetroleum product manufacturing and sales industry inOwerri Imo state, south east Nigeria.*
Methodology:*This is a cross sectional study in which relevant data is collected on worker personal variables and health hazardsencountered in the factory. Data isanalyzed using Microsoft Excel of the computer and the results are presented in frequency tables and bar chart.*
Results:*Majority of the respondents,110 (72.4%) of the workers can mention at least four occupational health hazards.In all the departments, higher proportions of females than males can mention at least 4 occupational hazards as follows: production (75%) purchase (100%), accounts (66.7%) and sales (76.9%), The production department records the highest number (161) of exposures to hazards, followed by the sales section (130), and with preponderance of male exposures to physical (32), chemical (35, mechanical (38), and psychosocial (25) hazards. Occupational health problems like cough, catarrh, burns and trauma are also identified.*
Conclusion:*Several occupational hazards have been identified amongst the workers of the petroleum based industry. Safe work environment and use of protective gadgets should be the priority of the company management. Pre-employment and periodic medical examinationsof workers should be mandatory.*
Keywords:*Occupational hazards, workers, petroleum industry.*

I. Introduction

BernardinoRamazzini, the acclaimed father of occupational health recognized the importance of a man's occupation as a cause of disease in year 1700 A.D[1]. He recommended that physicians should inquire about the patient's occupation in clerkship[1]. This will enable the physician relate the risk encountered in the work environment with the present ailment.[2]

Petroleum in one form or another has been used since ancient times and is now very important across the society including for economic, political and technological purposes[3]. The rise in its importance was mostly due to the invention of internal combustion engines, the rise in commercial aviation and increasing use of pesticides[4]. The chemical composition of petroleum makes its handling hazardous[4]. Chemicals such as methane and benzene which possess serious risks, are some of its constituents[4]. Benzene for example may cause bone marrow aplasia with early symptoms like headache, fatigue, anorexia, and later symptoms of anaemia.[4]

The petroleum product manufacturing and sales industry engages in engine oil production and sales. It also has filling stations as channels for sale and distribution of premium motor spirit (PMS) and gas (AGO). Aside chemical injuries, noise pollution, thermal burns, skin irritations and respiratory problems are some of the associated hazards seen in petroleum industries.[5,6]Proper handling and protective measures may go a long way in preventing such hazards. Very few studies have been carried out in our environment to examine the application of occupational health principles as it concerns the workers in petroleum–allied industries. It is important that such initial investigations be carried out to form the basis for possible occupational health interventions.

The objective of this study is to ascertainthe knowledge and pattern of occupational hazards faced by workers in a typical medium scale petroleum product manufacturing and sales industry in Owerri, Imo state, Nigeria.

II. Methodology

Study Area: The study is carried out at a medium scale petroleum product manufacturing and sales outlet located in Owerri, Imo state, south east Nigeria.

Study design: This is a cross sectional descriptive study to evaluate the occupational health hazards and preventive measures among workers in the industry.

Study Population: This comprises of all employees in all units of the industry viz: production, administration, sales, purchase and accounting departments. All the full time employees of the industry inOwerri irrespective of age or gender are included in the study.Visitors, customers, contract staff, those on industrial training and visiting technicians at the time of the study are excluded.

Sample Size Determination: Using the formular[6]below,the minimum sample size is determined thus: $N = \frac{Z\ pq}{d^2}$ Where n = minimum sample size, Z = standard deviation = 1.96, p = prevalence[7]of occupational hazards= 0.8%, q = Incidence (1-p), d^2 = standard error $(0.05)^2$

Thus $n = \frac{(1.96)\ X\ 0.78\ (1-0.78)}{(0.05)^2} = 134.$A total population study is however carried out and the questionnaires are distributed to all the 152 workers who meet the inclusion criteria.

Data Collection: Data is collected using both self and interviewer-administered questionnaires.Also inventory of personal protective equipment (PPE) is conducted by sighting and counting same in the record books.Collated data is analyzed using SPSS version 20and results are presented in frequency tables and bar charts.

Ethical Consideration: Ethical approval is obtained from the Ethics and Research Committee of IMSUTH Orlu. Written informed consents are gotten from the managing director of the industry and from each respondent, prior to commencement of the study.

III. Result

Table 1 shows that the predominant age group of the workers is 21-25 years, 51(33.6%) followed by 26-30 years at 30 (19.7%). The least prevalent age groups are$\leq$15 years who make up just 4(2.6%) and >45 years who constitutes 8 (5.3%) of all respondents. The mean age of the workers is 29.5$\pm$8.48 years.

Table 2 shows that out of a total of 152 respondents, 97 (63.8%) are males while 55 (36.2%) are females. Males are in the majority at the production department making up 53 (34.9%) of all employees, while there are more females in the sales section making up 26 (17.1%) of all employees.

The largest proportion of workers in the industry as shown in table 3, belongs to the production department 61 (40.1%), and majority of them attained secondary level of education 48 (31.6%). Sales department constitutes 34 (22.4%) of the workers, while purchase section makes up 25 (16.4%), and accounts and management departments constitute 20 (13.2%) and 12 (7.9%) respectively. Whereas management, production and accounting sections each makes up the highest proportion of workers that attained tertiary level of education 10 (6.6%), sales and purchase departments contribute zero and 2 (1.3%) of workers in the tertiary education pool.

Table 4 shows the proportion of workers in each department that has knowledge of occupational hazards presented according to gender and department. On the whole 110 (72.4%) of the workers can mention at least four occupational health hazards. In all the departments, higher proportions of females as shown in the production (75%) purchase (100%), accounts (66.7%) and sales (76.9%) departments than their male counterparts 64.2%, 60%, 54.5% and 63.3% respectively mention at least 4 occupational hazards. These findings are statistically significant ($p<0.01$). However, all the workers both males and females in the management section display good knowledge of occupational hazards by mentioning at least 4 of such hazards.

In table 5, the production department recorded the highest number of exposures to occupational hazards at 161, followed by the sales section at 130 exposures. Least exposures are experienced by those in management section who record only 14 occupational hazard exposures. The table shows that in the production department, males experience the greater number of exposures to physical (32), chemical (35, mechanical (38), and psychosocial (25) occupational hazards when compared to their female counterparts. Reverse is the case among workers in the sales department where more females than males experience greater number of hazard exposures than males.

Figure one is a pictorial depiction of pattern and amount of occupational health problems faced by the workers. Production department records the highest frequency of health problems followed by sales and then

purchase departments. Such health problems as weakness, cough, catarrh, burns, trauma and visual problems are reported.

Figure two depicts the relationship between availability of personal protective equipment(PPE), hazards awareness, and use ofthese equipment among the workers against the background of their total population in each department of the company. Generally awareness of hazards is high among the workers. However the usage of PPE at work is poor in all the departments when placed against the background of awareness and even availability especially in the accounts, management and sales departments. Total number of workers far outstrips available protective gadgets in all the departments except in the management section.

IV. Discussion

The study shows that there are more workers of the male gender than females in the company. This is contrary to outcome of another study in a petroleum industry in Boston United States of America where majority of the workers are females.[8]Employment opportunities indeveloping countries often favor the male genderwhose raw power may be handyin challengingbutlargelynon-mechanized brawn-based jobs.[9]

Majority of the respondents agree to the presence of one form of health hazard or the other in their factory premises. This is similar to the findings of another study byMbonigaba.[10]The workers in both studies agree that they are often exposed to mechanical, chemical and other hazards especially from factory machinery and chemicals. Presence of occupational hazards will undoubtedly result in the development of disease symptoms like hearing loss from noisy machines, skin rashes from chemical contact, respiratory difficulties, burns, cancer of the skin and pregnancy miscarriages among workers.[11,12]In this study, hazards such as inhalation of fumes and dusts, fire outbreak, electrical shocks and thermal burns are experienced mostly by respondents who work in the production department. Consequently, majority of the workers in this departmentpresent with respiratory symptoms such as cough, catarrh, difficulty in breathing and chest pain. This finding is similar to the observations made byEzejiofor et al in another study.[12]

Most of the respondents in this study are aware of the risks or hazards of their job and have knowledge of the safety regulations, and hazard-reducing PPE such as overalls, aprons, eye / face shields, goggles, protective leather hand gloves, boots and helmets. Unfortunately these PPE are not available in sufficient numbers in virtually all departments of the company except the management section.This may partly explain the reason why some of the workers would not wear the PPE despite their keen hazard risk perceptions revealed by the study. If the PPE are not available in sufficient quantity, then some workers will do their work without them. It is the duty of employers to protect employees from workplace hazards that can cause injury or illness.[13]This study does not, however,attempt to find out the other possible reasons why workers would not make use of PPE even where theyare made available.

Naturally, production department being the main centre of activity, tends to stand out as the unit with the largest users of these protective gadgets, while the management staff are the least users. The International Labour Organization (ILO) in Geneva has stipulated the required level of personal protective equipment expected in any standard industry.[14]This standard must be met for the good of the workers and the industry.

In conclusion,various occupational health hazards exist among workers of the Nigerianpetroleum-allied company. These include physical, mechanical, chemical, biological and psycho-socialhazards.Workers in the company's production department are the most exposed to these hazards and are subsequently most affected by corresponding occupational diseases. PPE are provided but not in adequate numberthussomeof the workers operated without them to their ownperil. Therefore, in the interest of workers and the industry, and for harmonious ergonomic and other benefits of the petroleum downstream sector, **t**he following recommendations are proffered: Provision of adequate PPE in the work place at all times, mandatory pre-employment and periodic medical examination of workers in order to identity occupational disease complications early enough,periodic training of workers on use of PPE, and enforcement of the use of same when available.

References

[1]. Obionu CN. Synopsis of Occupational and Environmental Health. Delta Publications (Nig) Limited Enugu, 2nd Edition 2005; 11-12.
[2]. Onyeabo G N. Occupational Health Problems in Nigeria. An over view:Int Jour EnvironHealthDev 2000; 2:1-7
[3]. Gary JH. Petroleum Refinery Technology and Economics London. The English University Press Ltd. 2nd Edition 2000; 1221-1225.
[4]. Asogwa SE. A guide to occupational Health Practice in Developing Countries Snap Press Ltd Enugu 3rd Edition 2012; 144-157.
[5]. Omokhodion FO. Health and safety at work. Jour Royal Soc for Health 2002; 122 (2): 118-121.
[6]. Naing L, Winn T, Rusli BN. Practical issues in calculating the sample size for prevalence studies. Arch Orofac Sci. 2006;1:9–14.
[7]. Senthil A, Anandh B, Jahachandran P, Thangavel G, Josehin D, Yamini R and Kalpana B. Perception and prevalence of work-related health hazards among health care workers in public health facilities in southern India. Int J Occup Environ Health. 2015 Jan-Mar; 21(1): 74–81. doi: 10.1179/2049396714Y.0000000096 PMCID: PMC4273523
[8]. Offshire industry: Management of Health hazards in the upstream petroleum industry (PDF download available) research gate.
[9]. Ayachan-dran, S. 2015. The Roots of GenderInequality in Developing Countries. Annual Review of Economics, volume 7: Submitted. DOI: 10.1146/annurev-economics-080614-115404.
[10]. Mbonigaba E. To Assess the Prevalence of Occupational Health Related Risks and Use of Safety Measures among Employees in Bralirwa Processing Industries in Rwanda. Occup Med Health Aff.2015; 3:215. doi:10.4172/2329- 6879.1000215

[11]. Inyang MP, Appraisal of Occupational Health Practices of Workers in an oil Producing Company in Port Harcourt Rivers State Nigeria. Port Harcourt Med Jour 2007; 2(1):67-73
[12]. EzejioforJIN, IwualaMOE, Osuala FOU, NwigweH.C.Risk assessment: Prevalent Occupational hazards in Nigeria Petroleum Industry. Jour Med Invest and Pract. 2012 ; 8(1): 1-3.
[13]. Employer Payment for Personal Protective Equipment Final Rule, Federal Register:November 15, 2007 (Volume 72, Number 220); Employers Must Provide and Pay for PPE, New Jersey Work Environment Council (WEC) Fact Sheet.
[14]. Occupational disease hazards in the oil and gas industry https://www.worksafebc.com/en/health-safety/industries/oil-gas (accessed: 25-4-2016)

TABLES AND FIGURES

TABLE 1: Age distribution of Respondents

Age in Years	**Frequency**	**Percent**
≤15	4	2.6
16 -20	8	5.3
21 -25	51	33.6
26 -30	30	19.7
31–35	19	12.5
36-40	21	13.8
41-45	11	7.2
>45	8	5.3
Total	152	100
Mean ± SD	29.5±8.48years	

TABLE 2 Sex distributions of Respondents According toDepartments.

Department	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Production	53	34.9	8	5.3	61	40.1
Purchase	21	3.8	4	2.6	25	14.6
Accounts	8	5.3	12	7.9	20	13.2
Sales	8	5.3	26	17.1	34	23.9
Management	7	4.6	5	3.3	12	5.4
Total	97	63.8	55	36.2	152	100

TABLE 3: Educational level of Respondents According to Departments

	Primary Education		Secondary Education		Tertiary Education		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Production	3	1.9	48	31.6	10	6.6	61	40.1
Sales	9	5.9	25	16.4	0	0.0	34	22.4
Purchase	8	5.3	15	9.9	2	1.3	25	16.4
Accounting	1	0.7	9	5.9	10	6.6	20	13.2
Management	1	0.7	1	0.7	10	6.6	12	7.9
Total	22	14.5	98	64.5	32	21.1	152	100

TABLE 4: General Knowledge of Occupational Hazards AmongtheRespondents

	Mentions at least four hazards	**Total males**	**Mentions at least four hazards**	**Total females**	**Total no of workers**	**X^2, p-value**
Department	**Males (%)**		**Females (%)**			
Production	34 (64.2)	53	6(75)	8	61	
Purchase	9 (60)	15	10(100)	10	25	
Accounts	6 (54.5)	11	6(66.7)	9	20	24.9
Sales	7 (63.6)	11	20(76.9)	23	34	P<0.01
Management	7 (100)	7	5(100)	5	12	
Total	64 (66)	97	46(83.6)	55	152	

Table 5: Exposures to Occupational Hazards by Gender and Department

Department	**Hazards**										
	Physical		**Chemical**		**Mechanical**		**Biological**		**Psychosocial**		***Total**
	M	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**Exposures**
Production	32	3	35	5	38	2	3	9	25	9	161
Accounts	5	10	6	4	3	12	2	8	5	10	65
Sales	5	23	5	23	5	20	6	14	6	23	130
Purchase	0	0	5	0	5	0	1	2	30	13	46
Management	0	0	0	0	0	0	1	1	7	5	14
*Total Exposures	42	36	51	32	51	34	13	34	63	60	416

*****Indication of multiple exposures to the various hazards

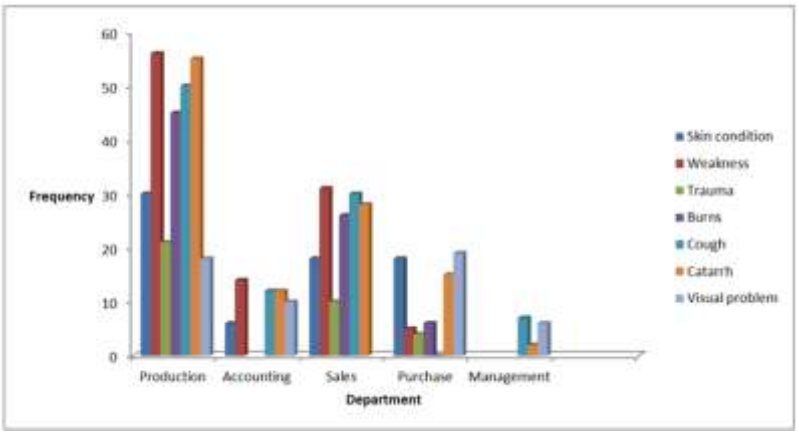

Figure 1: Pattern of Occupational Health Problems According toDepartments

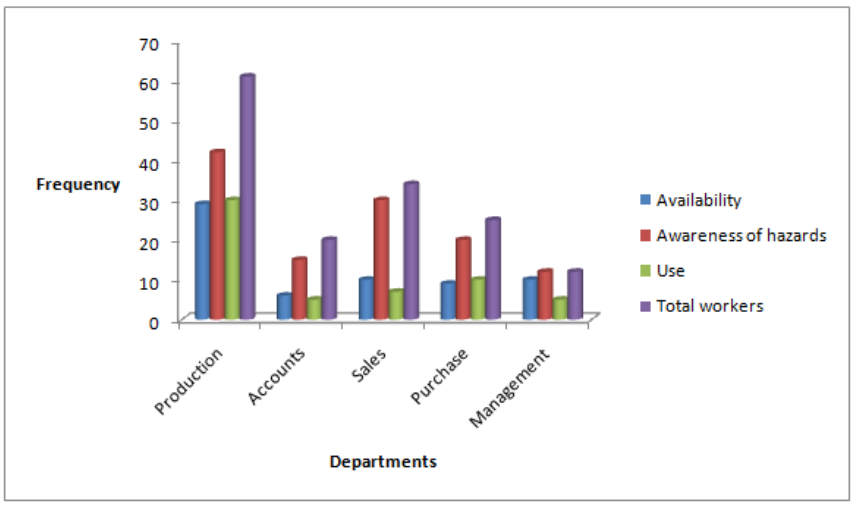

Fig 2: Hazard Awareness, Andavailability*Andusage of PPE among Workers

*Availability was determined by inventory (sighting and record books) of the safety gadgets likeoveralls, aprons, eye / face shields, goggles, protective leather hand gloves, boots and helmets