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Original Research Article

An Assessment of Supply, Use And Factors that Hinder use of Personal Protective Equipment in Medium Scale Manufacturing Industries in Anambra State South-East Nigeria

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Abstract

Background: Occupational safety and health is concerned with protecting the health, safety and welfare of people engaged in work or employment. It is a duty of every employer to ensure that all its employees remain safe at all times in order to boast its production activities. ***Objective:*** The study assessed the supply, use of personal protective equipment and factors that may affect its usage. ***Methods:*** The study is a descriptive cross-sectional study. There were 250 respondents from registered medium scale manufacturing industries in Anambra State. The sample was selected using a multistage sampling technique. The number of respondents from each factory was allocated proportionately according to size of the individual factors. Data was collected from October 2013 to May 2014. A pretested interviewer administered question was used. Analysis was done using statistical packages for social sciences version 20. Level of significance was set at 5%. ***Result:*** The supply of personal protective equipment was low as only hand gloves was always supplied (100%) while face mask and ear plug was never supplied. Use of personal protective equipment was assessed as never used, sometimes used or always used. More respondents have never used most of the personal protective equipment as 83.2%, 21%, 70.7%, 77%, 77.7%, 79.9%, 73.2% have never used helmets, hand gloves, goggles, safety boots, face marks, ear plug and apron respectively. The workers reported inadequate knowledge of use of personal protective equipment (42.4%) and unavailability of equipment as the major reason for poor use of personal protective equipment. ***Conclusion:*** The poor use of personal protective equipment, result from poor knowledge of its applicability and lack of the personal protective equipment. ***Recommendation:*** Government and relevant agencies should set up laws and enforce the supply of personal protective equipment by management of factories. Factories should employ a factory inspector who will enforce the compulsory use and also educate employees on the use and benefits of usage.

Keywords: Manufacturing Industries; Safety Practice, Reasons for non-use, safety equipment, personal protective equipment.

INTRODUCTION

The World Health Organization (WHO) and International Labour Organization (ILO) in 1950 defined occupational health as the promotion and maintenance of the highest degree of physical, mental and social well-being of all occupational workers by preventing departures from health, controlling risks and the adaptation of work to people and people to their jobs [1].

Occupational safety and health is concerned with the welfare of the workers and their families. Its aim is to ensure safety and health in the workplace [2]. Occupational safety and health is also important for moral and medico legal reasons. It involves the organization of the work place environment to make it safe at all times [3]. Occupational hazards and injuries lead to work abseentism, low productivity, financial losses to industries and even work related deaths in some cases. It has also been reported that about 402 accidents and 2,012 industrial injuries occur in Nigeria annually [4].

Previous studies [5] have shown that despite high knowledge/awareness and even formal trainings on safety, the use of personal protective devices were still low. This study looks at other factor then knowledge that can affect the use of personal protective

devices. The supply of personal protective equipment was compared to its use. Also the reasons for non-use of personal protective equipment were looked at.

MATERIALS AND METHODS

Study Area

Anambra State is one of the five states in south eastern Nigeria. It has a population of 4,182,032 in the 2006 national census. It covers a land area of 4416sqkm. It is inhabited by the Igbo speaking tribe of Nigeria. The literacy rate is 94.7% and 93.4% for males and females respectively for persons between the ages of 15-24years. There are 179 registered manufacturing industries. There are eight medium scale manufacturing industries in Anambra State and two in Awka [6].

Awka is the capital of Anambra State. It is located on coordinates 6.2069^0N and 7.0679^0E. Awka has a population of 301, 657 people.

Study Population

A total of 250 workers were used for this study. The medium scale manufacturing industries used for the study were a pharmaceutical and a plastic industry. One of the factories has a work force of 325 workers and is involved in producing drugs, while the other has a work force of 92 workers and produces plastics.

Inclusion

Those who have worked for a minimum of six months in the factories were eligible and must be between the legal working ages 18 and 65 years.

Exclusion

Workers on leave at the time of study and workers who did not give consent to participate were excluded.

Sample size was estimated using the formula

$$n = \frac{Z^2 Pq}{d^2}$$

Where,

n = minimum sample size

Z = standard normal deviate at 95% confidence interval = 1.96

P= Population practicing occupational safety in previous studies = 0.78[7]

q= 1-p (Proportion not aware of occupation safety) = 0.22

d= level of precision required = 0.1

A total of 132 was obtained then with a non-response rate of 17.7% from a previous study the sample size became 155. In order to increase the external validity and power of the study and avoid cluster effect, sample size was increased to 250.

Respondents were selected using a multistage sampling technique.

- First stage – Awka was selected using simple random sampling from a sampling frame of three (Awka, Onitsha and Nnewi).
- Second stage – The two medium scale manufacturing industries were purposively selected.
- Third stage – proportional allocation by size of the factories were done and systematic random sampling used to select respondents.

The proportional allocation according to size of factories was done mathematically by using the number of workers in the two factories and the sample size required.

- Factory A has a total of 325 workers
- Factory B has a total of 92 workers
- Total workers in both factories = 417 workers
- Allocation for factory A = 325/417 X 250 = 195 persons
- 195 workers was studied from Factory A
- Allocation for factory B = 92/417 X 250 = 55 persons
- 55 workers was studied from Factory A

The actual participants of the study was selected systematically using a sampling interval of 2(Factory A 325/195 = 1.7 and Factory B 92/55 = 1.7 which is approximately 2). Data was collected at close of work. The second person leaving the factory at close of each shift was studied at exit point.

Ethical approval was sort and obtained from Nnamdi Azikiwe University Teaching Hospital Ethical Review Board. Data was collected using a pre tested semi structured interviewer administered questionnaire that was duly validated by translation and back translation. Data was collected by principal researcher and two trained research assistants between October 2013 and April 2014. Data collected was analyzed using Statistical Packages for Social Sciences Version 20 software.

RESULT

Table-1 the supply of personal protective device was presented in Table-2. The use of personal protective equipment is as shown in Table-3 while reasons for non-use of personal protective equipmentsis in Table-4. Table 5 and 6 shows the relationships between education and sex of respondents with use of hand gloves.

Table-1: Socio Demographic Characteristics of Respondents

Characteristics	Frequency n=250	Percentage (%)
AGE GROUPS (YEARS)		
18-22	20	8.0
23-27	70	28.1
28-32	33	13.0
33-37	16	6.2
38-42	32	16.5
43-47	41	12.9
48-52	17	6.7
53-57	3	1.3
58-62	18	7.2
SEX		
MALE	221	88.4
FEMALE	39	11.6
EDUCATIONAL LEVEL		
NO EDUCATION	3	1.3
FIRST SCHOOL LEAVING CERTIFICATE	6	2.2
SECONDARY SCHOOL CERTIFICATE	62	25
POST SECONDARY SCHOOL	179	71.4
MARITAL STATUS		
MARRIED	145	58
NEVER MARRIED	91	36.6
DIVORCED/SEPARATED	14	5.4
RELIGION		
CATHOLIC	109	43.8
ANGLICAN	64	25
PENTECOSTAL	73	29
MUSLIM	4	1.3
ETHNICITY		
IGBO	193	77.2
HAUSA	1	0.4
YORUBA	5	1.8
OTHERS	51	20.5
YEARS OF WORK EXPERIENCE		
BELOW 1 YEAR	48	19.2
BETWEEN 1 AND 5 YEARS	97	38.9
ABOVE 5 YEARS	105	42.0
DEPARTMENTS		
ADMINISTRATION	66	26.3
PRODUCTION	184	73.7

Table-2: Supply of Personal Protective Equipments

Characteristics	Frequency	Percentage (%)
Safety boot		
Yes	1	0.4
No	223	96.9
Helmet		
Yes	0	0
No	224	100
Hand gloves		
Yes	224	100
No	0	0
Google		
Yes	71	31.5
No	153	68.5
Facemask		
Yes	91	40.8
No	133	59.2
Ear plug		
Yes	0	0
No	224	100
Apron/overall		
Yes	88	39.3
No	136	60.7

Table-3: Use of Personal Protective Equipments

Characteristics	Frequency n=244	Percentage (%)
HELMETS		
Never	164	83.2
Sometimes	33	16.8
Always	0	0
HAND GLOOVES		
Never	47	21
Sometimes	66	14.4
Always	111	49.6
GOGGLE		
Never	145	70.7
Sometimes	56	24.1
Always	4	1.7
SAFETY BOOTS		
Never	151	77
Sometimes	45	23
Always	0	0
FACEMASK		
Never	175	77.7
Sometimes	29	6.3
Always	21	4.6
EAR PLUG		
Never	179	79.9
Sometimes	45	9.8
Always	0	0
APRON		
Never	164	73.2
Sometimes	48	21.4
Always	12	5.4

Table-4: Reasons for Non Use of Personal Protective Device

Characteristics	Frequency n=224	Percentage (%)
Do not have adequate knowledge of its use	86	42.4
Lack of equipments	85	41.9
Don't think it is necessary	20	9.9
Feels uncomfortable with it	12	5.9
Makes work difficult	0	0

Table-5: Age in relation to use of personal protective equipments (gloves)

Practice of occupational safety (use of hand glooves)				
Age	**Never**	**Sometimes**	**Always**	**Total**
<30	27	30	51	108
31-50	7	30	60	97
>50	13	6	0	19
Total	**47**	**66**	**111**	**224**

Fishers exact =43.660, df = 4, p = 0.016 (statistically significant)

Table-6: Sex in relation with practice of occupational safety (use of hand gloves)

Practice of occupational safety (use of hand glooves)				
	Never	**Sometimes**	**Always**	**Total**
Male	47	66	98	211
Female	0	0	13	13
Total	**47**	**66**	**111**	**224**

Pearson Chi-square = 14.05, df = 2, p = 0.001
Fishers Exact test = 13.81 df = 2, p = 0.000

Table-7: Education and relationship with practice of occupational safety

Practice of occupational safety (use of hand glooves)				
	Never	**Sometimes**	**Always**	**Total**
First School Leaving Certificate FSLC	2	0	0	2
Secondary School Certificate SSCE	21	8	28	57
Post Secondary School	24	58	83	165
Total	**47**	**66**	**111**	**224**

Pearson Chi-square = 77.51, df = 4, p = 0.000

DISCUSSION

The study revealed that the mean age of the respondents was 35±11 years. This shows a young working population. The findings in this study were consistent with studies in other parts of the country [6, 8] where the ages also reflect a young working population. Majority of the workers were males and most had post-secondary education. The preponderance of young males seen in this study could be as a result of tedious physical activity involved in the pharmaceutical and plastic manufacturing. Their jobs also involved lifting of heavy equipment and finished product packaging. This may discourage the involvement of females and older persons from working in the factories. This suggests the need for studies in industries with less strenuous physical activity such as the hospitality industries where marked gender disparity might not exist.

Supply of personal protective equipment in this study was low. Some devices like helmet and ear plug was never supplied by management. Surprisingly safety boot was reported supplied by only 0.4% of respondents. Interestingly hand gloves were in constant supply as all respondents had access to hand gloves for their use. Other personal protective devices were in short supply at 31.5%, 40.8% and 39.3% for goggles, facemask and apron. This observation is in contrast with the study in Zimbabwe [9] where 50% of the required protective equipment was provided. It is then imperative that researchers should explore the factors that lead to this disparity in supply of personal protective equipment between factories. Could it be that some regulatory bodies exist in Zimbabwe enforcing the supply of personal protective equipment or simply a safety conscious factory management seeking the health protection of its workers.

From the above, most personal protective equipment were never used by more than 70% of the workers. 83.2%, 70.7%, 77%, 77.7%, 79.9% and 73.2% never used helmets, goggles, safety boots, face mask, ear plug and apron respectively. Most workers used hand gloves always while 14.5% used hand gloves sometimes and only 21% never used hand gloves. When use of personal protective equipment is compared to its supply, we will realize that supply of personal protective equipment influences its use. Notice that the supply of hand gloves was high and its use was also high. We can deduce from this that supply of personal protective equipment if improved will increase the use. From the data in this study, It is clear that the workers are left to protect themselves since management did not supply required safety equipment yet some of the workers used them. This is clearly a violation of Legge's Aphorism 1 which states that "unless and until the employer has done everything and everything means a good deal –the workman can do reset to protect himself, although he is naturally willing enough to do his share". The employer by not supplying the personal protective equipment has not done everything to protect his workers.

The use of hand gloves though higher than other personal protective equipment but does not reflect its content supply noted in this study.

High use of hand glove was noted in other studies [10] some of these studies were done with health workers who have high knowledge of health and understands the implication of handling human samples without gloves. However, studies using non-medical workers also reflected higher use of hand gloves than in this present study. Another factor that may positively influence the use of hand gloves is that one working without gloves can easily feel cuts, swelling, hotness and chafe after working without gloves. Therefore workers are likely to use hand gloves un-coerced than other personal protective equipment that effect of non-use takes time to notice. The supply of hand gloves noted in this study could be resulting from pressure from workers on management to provide hand gloves for them.

The reason for non-use of personal protective equipment by most respondents were lack of adequate knowledge on its use (42.4%) and lack of personal protective equipment (41.9%). Only few did not think the use of personal protective equipment was necessary (9.9%) nor feels uncomfortable with it (5.9%). None of the respondents feels personal protective equipment made work difficult. This is in contrast with a research in Kaduna[8] where the workers reported feeling uncomfortable and makes work difficult as their reason was also in agreement with a study in Lagos-Nigeria where the reason for non-use of personal protective equipment were lack of knowledge of occupational hazards associated with inconsistent use of safety devices and non-availability of protective devices [11]. One can deduce that availability of personal protective equipment is a major reason for poor use of personal protective equipment. On the other hand, if supply is improved and knowledge of its usefulness is not improved then use may remain low. To improve the use of personal protective equipment in factories, it must be available, workers must know of its gains and its use must be enforced and not left to the discretion of every individual worker.

The factors influencing the use of personal protective equipment in this research were sex and education. The females were more likely to use it more than males and the more educated workers also uses personal protective equipment than there less educated counterparts. This is as shown in Tables 5 and 6. More educated workers had high practice of occupational safety.

Age of respondents also influenced the use of personal protective equipment, there is increased use of

personal protective equipment up to a certain age before decline in its use. There is increase safety consciousness with increasing age until at an age where the worker begins to believe that he is immune to accidents. Some studies here noted a relationship between the number of years of working in a factory and the level of accidents. Accidents reduces with years of experience until at some points when it increases again* This observation is similar to what was noticed in this study.

CONCLUSION

This study revealed the poor safety consciousness of our factory management. This is reflected in their poor supply of personal protective equipment. The management of factories did not enforce use of personal protective equipment even when in supply. The reasons for increase of personal protective equipment were lack of knowledge of its use and unavailability of this safety equipment.

RECOMMENDATION

One seeking to improve the health of the working population must first engage their employers to provide more conducive environment for safety practices. It is therefore recommended that government through its department of labour and productivity should ensure thorough legislation and its enforcement that factory workers are provided safety equipment. The factories should employ safety officers who will enforce the compulsory use of personal protective equipment in our factories. There should be training and retraining of workers on use of personal protective equipment to stimulate un-coerced use of personal protective equipment.

Conflict of Interest

There are no conflicting interests in this research work.

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