International Journal of Innovative Healthcare Research 6(3):36-42, July-Sept., 2018

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Personal Protective Equipment Usage And Socio-Demographic Difference Among Oil And Gas Workers In Rivers State

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ABSTRACT

This study investigated personal protective equipment usage and socio-demographic difference among oil and gas workers in Rivers State. The research design adopted for this study was descriptive survey design. The estimated population of the study was one thousand, two hundred and sixty-one oil and gas workers. A sample size of 461 was determined using the Taro Yamane formula. A simple random sampling technique was used for the study. The instrument for data collection was a structured questionnaire with a reliability coefficient of 0.70. Data collected was analyzed using percentage, mean, standard deviation and ANOVA. The findings of this study shows that the utilization ($\bar{X}$ = 2.77±0.78) of personal protective devices among oil and gas workers was high. There was a statistically significant difference in the utilization of PPD based on training ($p<0.05$) and years of work experience ($p<0.05$) while factors such as educational status ($p>0.05$) and age ($p>0.05$) was not found to be statistically significant with the utilization of personal protective devices among oil and gas workers in Rivers State. It was concluded that, utilization of personal protective devices was high among oil and gas workers in Rivers State. Recommendation made among others is that, the oil and gas companies should not relent in the measures put in place to ensure adequate utilization of personal protective devices among workers.

Keywords: Personal Protective Devices, Workers, Utilization, Oil and Gas.

INTRODUCTION

The use of personal protective device is one of the important measures to safeguard workers from exposure to occupational hazards. Paulson (2017) defined PPE as a large group of products designed to protect workers from workplace hazards and all equipment which is intended to be worn or held by a person at work and which protects him against one or more risks to his health or safety. Workers daily activities can go on smoothly when available safety wears are used. However, Dessie, Adane, Nega, Wami and Chercos (2018) noted that there is a dearth of studies describing personal protective equipment utilization among oil and gas workers in Rivers State. Workplace is an important part of human environment, the health, efficiency and productivity of workers in any company are usually influenced by conditions in their work environment. It is essential to note that no occupation is without risk of hazard. Thus, thousands of workers around the world suffer different degrees of injuries, incapacitations and other human and material losses due to occupational accidents on daily basis. This state of risks in a work environment is often referred to as occupational hazards (Mroz, 2013).

Workers in various occupations are exposed to variety of hazards in the occupational environment which may cause various illness if not controlled. Anuradha, Tanu, Jugal, Tor and Gopal (2014), opined that the hazards are related to physical condition such as temperature, humidity, noise, light, chemical agents in the form of vapours, fumes, droplets, gases and unsafe and unprotected machines and technical equipment

responsible for causing accidents. Tripathy and Panda (2008) defined hazard as a situation which poses a level of threat to life, health, property or environment. Occupational hazards can encompass many types of hazards, including chemical hazards, biological hazards, psychosocial hazards and physical hazards. In line with this, Moses (2016) stated that workers in the oil and gas industry like other occupations are constantly exposed to different kinds of occupational hazards at different stages. This ranges from exploration, exploitation and even exportation especially in developing countries where implementation of occupational safety control principles remain a big challenge. Thus, the work environment which should ordinarily promote the health of man has turned out to become a death trap. This makes the use of personal protective devices imperative especially in this part of the globe where employees find it difficult to put engineering hazard control measures in place for their employees.

Deliberate attempt to prevent the effect of occupational hazard through effective utilization of Personal Protective devices (PPDs) is pertinent. The Joint International Labour Organization and World Health Committee in Omololu (2015), the cost of occupational accident is incalculable and the number of deaths recorded yearly as a result is more than that of all other causes put together. This ugly trend is often attributable to either the absence of safety precautions and gadgets or non-utilization of personal protective devices provided or both (Asuzu, 2012). In some cases, even when they are provided, workers do not use them. It is worthy to note that, the utilization of Personal Protective devices reduces the effects of occupational health related diseases on workers; it can also prevent accidents and injury from happening. By lowering these risks, sickness is reduced and time involved in near miss and legal prosecution is avoided. This condition could also be applicable to oil and gas workers in Rivers State. However, certain factors are found to influence the utilization of personal protective devices among workers including their educational level.

The educational level of workers could have influence on the extent to which personal protective equipment is utilized by oil and gas workers in Rives State. Brunette (2016) opined that one with educational qualification has been modified by training and as such could impart positively on others in terms of accident prevention. Oluwagbami (2014), therefore argues that every single accident that occurs in an occupational environment has the capacity of adversely affecting the morale of others besides the time lost and other damages caused. It also tarnishes the corporate image and reputation of the company as well as increase their over-head cost. Several studies including that of Banford (2014) and Mroz (2013) shows that educational qualification influence workers attitude, efficiency, dedication and productivity and it could have similar influence on utilization of personal protective devices by oil and gas workers in Rivers State. It is against this backdrop that this study seeks to investigate the utilization of personal protective devices among oil and gas workers in Rivers State.

Research Questions

This study provided answers to the following research questions:

1. What is the level of utilization of personal protective devices among oil and gas workers in Rivers State?
2. What is the level of utilization of personal protective devices among oil and gas workers in Rivers State with regards to training?
3. What is the level of utilization of personal protective devices among oil and gas workers in Rivers State with regards to years of work experience?
4. What is the level of utilization of personal protective devices among oil and gas workers in Rivers State with regards to educational status?
5. What is the level of utilization of personal protective devices among oil and gas workers in Rivers State with regards to age?

Hypotheses

The following hypotheses postulated were tested at 0.05 alpha level:

1. There is no significance difference in the utilization of personal protective devices among oil and gas workers in Rivers State based on training.
2. There is no significance difference in the utilization of personal protective devices among oil and gas workers in Rivers State based on years of work experience.

3. There is no significance difference in the utilization of personal protective devices among oil and gas workers in Rivers State based on educational status.
4. There is no significance difference in the utilization of personal protective devices among oil and gas workers in Rivers State based on age.

METHODOLOGY

The research design adopted for this study was a descriptive survey design. This design is applied in situations where the researcher describes an existing condition exactly the way it appears without manipulating any of the variables (Kothari, 2014). The population for this study was estimated to be one thousand two hundred and sixty-one (1,261) workers in oil and gas companies in Rivers State. A sample size of 461 was determined using the Taro Yamane formula: $n = N/ (1+N (e)^2$. Where; n = Sample size; N = Population; e = Margin of error (0.05). The instrument for data collection was a structured questionnaire with a reliability index of 0.70 titled, Utilization of Personal Protective Devices Questionnaire (UPPDQ) which was developed by the researcher. The questionnaire consisted of two sections A, and B. Section A captured the personal information such as age, training, years of work experience, educational status, department, religion, and marital status while Section B was designed to elicit response on the utilization of personal protective devices among the respondents on a modified four point likert scale: always, sometimes, rarely and never. The validity of the Instrument was established by the project supervisor and two other lecturers in the Department of Human Kinetics, Health and Safety Education in Ignatius Ajuru University of Education, Port Harcourt. The instrument for data collection, AUPPEQ was administered directly to the respondents by the researcher. The researcher adequately explained the procedure for responding to the questionnaire. Respondents were required to tick the option that represents their opinion in each of the items in the questionnaire. Due to the limited time frame for the study, only few questionnaires were administered by the researcher for data collection which were expiated for the analysis. The instrument was retrieved from the respondents by the researcher on the spot after completion. The data collected was analyzed using statistical package for social sciences version 23.0. The research questions were answered using mean and standard deviation while the hypotheses were tested using the analysis of variance (ANOVA) at 0.05 alpha level.

RESULTS

The results of the study are presented below in Table 1-

Table 1: Utilization of personal protective devices

SN	Utilization of personal protective devices	Mean	SD
1	Use of helmet or hard hat while working	3.48	.76
2	Use of face shield	2.43	.98
3	Use of nasal mask	2.90	.85
4	Use of safety boot while working	2.69	.59
5	Use of safety eye goggle at work	3.11	1.01
6	Use of hand gloves during work	2.67	.57
7	Use of ear plugs and muff for sound protection at the work place	2.58	1.14
8	Use of coverall at the site	2.83	.41
9	Use of harness belt when working on a high platform	2.27	.74
	Grand mean	**2.77**	**0.78**

Criterion mean = 2.5

Table 1 shows the utilization of personal protective devices for workers in oil and gas companies. The result shows that the grand mean = 2.77±0.78 is greater than the criterion mean = 2.5 indicating that utilization of personal protective devices was high.

Table 2a: Utilization of personal protective devices among oil and gas workers based on training

Training		Utilization of Personal Protective Devices									Grand mean
		Helmet or hard hat	Face shield	Nasal mask	Safety boot	Eye goggle	Hand gloves	Ear muff	Coverall	Harness belt	
Company	$\bar{X}$	3.74	2.40	3.26	2.61	3.74	2.42	2.36	2.80	2.50	**2.87**
	SD	.572	1.115	.572	.714	.439	.718	.932	.402	.622	**0.67**
Voc/Tech	$\bar{X}$	3.32	2.20	3.17	2.83	2.98	2.66	2.63	2.66	2.66	**2.79**
	SD	.471	.901	.704	.381	1.172	.480	1.392	.762	.480	**0.74**
Safety Inst	$\bar{X}$	3.32	2.23	2.66	2.59	2.74	2.68	1.99	2.76	2.23	**2.58**
	SD	.859	1.010	1.045	.647	1.245	.626	1.149	.432	.725	**0.86**
On-the-job	$\bar{X}$	3.44	2.60	2.75	2.75	2.93	2.81	2.96	2.93	2.06	**2.80**
	SD	.841	.884	.840	.507	.940	.393	1.041	.260	.798	**0.72**

Table 2a showed the utilization of personal protective devices among workers in oil and gas companies based on training. The result shows that utilizations of personal protective devices was more among respondents who were trained in by company ($\bar{X}$ = 2.87±0.67) followed by those who had on-the-job training ($\bar{X}$ = 2.80±0.72), vocational and technical college ($\bar{X}$ = 2.79±0.74) and those who were trained by safety institute ($\bar{X}$ = 2.58±0.86). Thus based on training, personal protective devices were utilized more among those who were trained in a company.

Table 2b: Analysis of Variance (ANOVA) showing difference in the utilization of personal protective devices among oil and gas workers in Rivers State based on training

Sources of variance	Sum of squares	df	Mean sum of squares	F-value	p-value	Decision
Between group	4.288	3	1.429	8.128	.000	H_o
Within group	70.863	403	.176			Rejected
Total	75.151	406				

*Significant. p<0.05

The result in Table 2b showed that there was a significant difference in in the utilization of personal protective devices based on training [F(3, 406) = 8.128; p<0.05]. Therefore, the null hypothesis which states that there is no significant difference in the utilization of personal protective devices among oil and gas workers in Rivers State based on training was rejected

Table 3a: Utilization of personal protective devices among oil and gas workers based on years of experience

Years of experience		Utilization of Personal Protective Devices									Grand mean
		Helmet or hard hat	Face shield	Nasal mask	Safety boot	Eye goggle	Hand gloves	Ear muff	Coverall	Harness belt	
1-5yrs	$\bar{X}$	3.42	2.45	2.74	2.66	2.79	2.62	2.57	2.80	2.17	**2.69**
	SD	.811	.973	.887	.581	1.096	.597	1.198	.471	.734	**0.82**
5-10yrs	$\bar{X}$	3.61	2.55	3.20	2.68	3.52	2.63	2.63	2.89	2.37	**2.89**
	SD	.755	1.033	.619	.663	.687	.587	1.149	.313	.812	**0.73**
≥11yrs	$\bar{X}$	3.43	1.98	2.89	2.85	3.59	3.00	2.46	2.85	2.46	**2.83**
	SD	.501	.774	.994	.363	.717	.000	.751	.363	.504	**0.55**

Table 3 showed that the utilizations of personal protective devices was more among respondents who had 5-10 years ($\bar{X}$ = 2.89±0.73) followed by those who had ≥11yrs ($\bar{X}$ = 2.83±0.55) and those who had 1-5 years of work experience ($\bar{X}$ = 2.69±0.82). Thus based on years of work experience, those who had longer years of work experience utilized personal protective devices more than those who had fewer years of work experience.

Table 3b: Analysis of Variance (ANOVA) showing difference in the utilization of personal protective devices among oil and gas workers in Rivers State based on years of experience

Sources of variance	Sum of squares	df	Mean sum of squares	F-value	p-value	Decision
Between group	3.712	2	1.856	10.497	.000	H_o
Within group	71.438	404	.177			Rejected
Total	75.151	406				

*Significant. p<0.05

Table 3b showed that there was a significant difference in the utilization of personal protective devices based on years of work experience [F(2, 404) = 10.497; p<0.05]. Therefore, the null hypothesis which states that there is no significant difference in the utilization of personal protective devices among oil and gas workers in Rivers State based on years of work experience was rejected.

Table 4a: Utilization of personal protective devices among oil and gas workers based on educational status

Educational status		Utilization of Personal Protective Devices									Grand mean
		Helmet or hard hat	Face shield	Nasal mask	Safety boot	Eye goggle	Hand gloves	Ear muff	Coverall	Harness belt	
No formal	$\bar{X}$	4.00	3.00	3.00	2.00	2.00	2.00	4.00	2.00	3.00	**2.78**
	SD	.000	.000	.000	.000	.000	.000	.000	.000	.000	**0.00**
Secondary	$\bar{X}$	3.60	2.22	2.69	2.84	2.75	2.68	2.33	2.76	2.40	**2.69**
	SD	.493	.982	.840	.547	1.203	.739	1.064	.430	.619	**0.76**
Tertiary	$\bar{X}$	3.44	2.46	2.96	2.66	3.23	2.68	2.62	2.87	2.21	**2.79**
	SD	.829	.966	.853	.594	.928	.513	1.147	.398	.772	**0.78**

Table 4 showed that the utilizations of personal protective devices was more among respondents who had tertiary education ($\bar{X}$ = 2.79±0.78) followed by those who had no formal education ($\bar{X}$ = 2.78±0.00) and those who had secondary education ($\bar{X}$ = 2.69±0.76). Thus based on educational status, those who had higher educational status utilized personal protective devices compared to those who had lower educational status.

Table 4b: Analysis of Variance (ANOVA) showing difference in the utilization of personal protective devices among oil and gas workers in Rivers State based on educational status

Sources of variance	Sum of squares	df	Mean sum of squares	F-value	p-value	Decision
Between group	.708	2	.354	1.922	.148	H_o
Within group	74.442	404	.184			Accepted
Total	75.151	406				

*Not Significant. p>0.05

Table 4b showed that there was no significant difference in the utilization of personal protective devices based on educational status [F(2, 404) = 1.922; p>0.05]. Therefore, the null hypothesis which states that there is no significant difference in the utilization of personal protective devices among oil and gas workers in Rivers State based on educational status was rejected.

Table 5a: Utilization of personal protective devices among oil and gas workers based on age

Age		Utilization of Personal Protective Devices									Grand mean
		Helmet or hard hat	Face shield	Nasal mask	Safety boot	Eye goggle	Hand gloves	Ear muff	Coverall	Harness belt	
21-30yrs	$\bar{X}$	3.49	2.48	2.93	2.64	3.11	2.57	2.64	3.11	2.57	**2.84**
	SD	.774	1.006	.892	.650	1.013	.629	.650	1.013	.629	**0.80**
31-40yrs	$\bar{X}$	3.49	2.42	2.93	2.77	3.01	2.84	2.77	3.01	2.84	**2.89**
	SD	.868	.973	.771	.426	1.078	.369	.426	1.078	.369	**0.71**
41-50yrs	$\bar{X}$	3.49	2.03	2.68	3.00	3.30	3.00	3.00	3.30	3.00	**2.97**
	SD	.507	.833	.747	.000	.968	.000	.000	.968	.000	**0.44**
51-60yrs	$\bar{X}$	3.00	3.00	3.00	2.00	3.00	3.00	2.00	3.00	3.00	**2.78**
	SD	.000	.000	.000	.000	.000	.000	.000	.000	.000	**0.00**

Table 5a shows the utilization of personal protective devices among workers in oil and gas companies based on age. The result shows that utilizations of personal protective devices was more among respondents who were within the age range of 41-50 years ($\bar{X}$ = 2.97±0.44) followed by those aged 31-40 years ($\bar{X}$ = 2.89±0.71), 21-30 years ($\bar{X}$ = 2.84±0.80) and those aged 51-60 years ($\bar{X}$ = 2.78±0.00). Thus based on age, those who were older utilized personal protective devices compared to those who were younger.

Table 5b: Analysis of Variance (ANOVA) showing difference in the utilization of personal protective devices among oil and gas workers in Rivers State based on age

Sources of variance	Sum of squares	df	Mean sum of squares	F-value	p-value	Decision
Between group	.721	3	.240	1.301	.274	H_o
Within group	74.430	403	.185			Accepted
Total	75.151	406				

*Not Significant. p>0.05

Table 5b shows the One-Way ANOVA of significant difference in the utilization of personal protective devices among oil and gas workers in Rivers State based on age. The result shows that there was no significant difference in the utilization of personal protective devices based on age [F(2, 404) = 1.301; p>0.05]. Therefore, the null hypothesis which states that there is no significant difference in the utilization of personal protective devices among oil and gas workers in Rivers State based on age was rejected.

DISCUSSION OF FINDINGS

The result showed that the grand mean = 2.77±0.78 is greater than the criterion mean = 2.5 indicating that utilization of personal protective devices was high. The personal protective equipment used include helmet, nasal mask, face shield, hand gloves, coverall, safety foot and harnessing belt among others. The finding of this study is encouraging because utilization of personal protective devices is imperative as one of the most effective risk control measures especially in oil and gas industries. This finding is in line with Gordon (2017) who specified the different types of PPE workers must use which include safety boots, face masks, safety goggles, safety hats, safety coverall and ear muff which are used to protect the different parts of the body. The finding of this study is also similar to that of the Bureau of Statistics (2015) where a high level of utilization of personal protective equipment was reported. The finding of this study is in keeping with that of Selvam and Krithika (2010) were helmet and safety boot were among the top three personal protective equipment used among construction workers. The fact that the respondents

in the previous study and that of the present study had similar characteristics might be the reason for the similarities found between the both studies.

The result shows that utilizations of personal protective devices was more among respondents who had 5-10 years ($\bar{X}$ = 2.89±0.73) followed by those who had ≥11yrs ($\bar{X}$ = 2.83±0.55) and those who had 1-5 years of work experience ($\bar{X}$ = 2.69±0.82). Thus based on years of work experience, those who had longer years of work experience utilized personal protective devices more than those who had fewer years of work experience. The tested hypothesis on this shows that there is a significant difference in the utilization of personal protective devices based on years of work experience [F(2, 404) = 10.497; p<0.05]. Experience is one of the most-used terms in a workplace, and it is recognized as being related to learning. Experience play a major role in determining a person's performance at workplace because it enhances adequate participation at workplace. Experience can also have an effect on one's social interactions and dedication to work. Experience, in its fundamental sense, is that which, by putting us in play ourselves, modifies us profoundly in the job we do. The finding of this study gives credence to that of Roughton (2002), who opined that workers' year of experience contributes a lot to non-utilization of personal protective devices and that most accidents in the work place are traceable to workers level of experience and the utilization of safety devices.

The result shows that utilizations of personal protective devices was more among respondents who were trained in by company ($\bar{X}$ = 2.87±0.67) followed by those who had on-the-job training ($\bar{X}$ = 2.80±0.72), vocational and technical college ($\bar{X}$ = 2.79±0.74) and those who were trained by safety institute ($\bar{X}$ = 2.58±0.86). Thus based on training, personal protective devices were utilized more among those who were trained in a company. The tested hypothesis on this shows that there was a significant difference in in the utilization of personal protective devices based on training [F(3, 406) = 8.128; p<0.05]. This finding is not surprising because training influences several aspects of one's occupation. Training gives an individual an edge of his/her untrained counterpart. Training is a highly useful tool for improving workers' competency. It increases the knowledge of workers to a position where they can do their job correctly, effectively and conscientiously. The finding of this study is in line with that of Tadesse, Kelaye and Assefa (2016) which showed that one of the reasons workers do not use personal protective equipment is because of lack of safety training. The finding of this study is line with the assertion of Yusuf (2008) that regular training on safety for workers as a solution for reduction of risk, and health hazard in the workplace and that poor compliance to safety rule can be attributed to lack of training. Training improves workers' efficiency and effectiveness as well as the development of self confidence in carrying out specific duties such as the use of personal protective devices during work.

The result shows that utilizations of personal protective devices was more among respondents who had tertiary education ($\bar{X}$ = 2.79±0.78) followed by those who had no formal education ($\bar{X}$ = 2.78±0.00) and those who had secondary education ($\bar{X}$ = 2.69±0.76). Thus based on educational status, those who had higher educational status utilized personal protective devices compared to those who had lower educational status. Education influences several aspects of life including the decision to utilize personal protective devices. The vital role of education to human existence makes it pertinent for the society to heavily invest in it. The finding of this study is in keeping with that of Prashar and Bansal (2012) who argued that disobedient to management policies is more prevalent among workers with good educational qualifications which was attributed to the pride of being marketable based on vast knowledge, experience and contribution. The finding of this study is also in keeping with that of Sabitu, Liyasu and Dauda (2014) which is of the view that most qualified workers in many industries in Nigeria feel that the utilization of personal protective equipment is for low or non-educationally qualified, and would like to distinguish themselves from them by not utilizing their personal protective devices.

CONCLUSION

Based on the findings of the study, it was concluded that, utilization of personal protective devices among oil and gas workers was high among oil and gas workers in Rivers State.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made:

1. The oil and gas companies should not relent in their effort to make personal protective devices available for their employees both the new workers and the old workers.
2. The oil and gas companies should not also relent in the measures put in place to ensure adequate utilization of personal protective devices to sustain the high level of utilization found in this study.
3. Employees should also make deliberate effort to ensure they use the appropriate personal protective devices for each job or task assigned to them.
4. Safety professionals in the oil and gas companies should focus on areas such as training and years of experience when designing interventions to promote personal protective devices utilization among workers.

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