International Journal of Humanities Social Science and Management (IJHSSM)
Volume 3, Issue 2, Mar.-Apr. 2023, pp: 912-918 www.ijhssm.org

Assessment of Level of Compliance to Occupational Safety Measures among Laboratory Professionals in Universities in Rivers State

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Date of Submission: 03-04-2023 Date of Acceptance: 16-04-2023

ABSTRACT
This study assessed the level of knowledge of occupational hazards and compliance to safety measures among laboratory professionals in government universities in Rivers State. The population for this study comprised of all the four hundred and fifty-five (454) laboratory workers in the three government universities in Rivers State which were all included in the study. A structured questionnaire with a reliability coefficient of 0.87 was used for the collection of data and analysis was done using percentage, mean, standard deviation. The result shows that knowledge of occupational hazards was high among laboratory professionals as the overall mean = 3.05±.807 was greater than the criterion mean = 2.5. For the different types of hazards, knowledge of chemical hazards ($\bar{X}$ = 3.51) was more followed by biological hazards ($\bar{X}$ = 3.05), physical and ergonomic hazards ($\bar{X}$ = 2.75) and knowledge of psychosocial hazards ($\bar{X}$ = 2.49). The findings of the study also show that there was a high level of compliance to safety measures by laboratory professionals. It was concluded that knowledge of occupational hazards was high and there was a high level of compliance to safety measures among laboratory professionals in government Universities in Rivers State. However, it was recommended that all Tertiary institutions and the Ministry of health at all level should work in synergy to design and implement safety training and retraining programmes for laboratory professionals to sustain the high level of safety compliance found among them.

Keywords: knowledge, compliance, occupational safety measures, laboratory professionals

I. Introduction

The Laboratory is an exemplary site of modernity. In it, human and machine, organisms and mechanisms, body and technology combine and contrast with one another to produce new scientific facts. It is impossible to imagine science without laboratories. A laboratory is a room or building with scientific equipment for doing scientific tests or for teaching science, or a place where chemicals or medicines are produced (Cambridge Advanced Learner's Dictionary & Thesaurus online, 2020). However, the beginnings of the laboratory are to be found in in the early modern period. In particular, the workshops of alchemists, apothecaries and metallurgists, and subsequently all accommodation in which natural phenomena and processes where explored by means of tools and instruments were referred to as laboratories from the 17th century onwards. So the laboratory " is room or building set apart for scientific experiments," from Medieval Latin laboratorium "a place for labor or work," from Latin laboratus, past participle of laborare "to work" (online etymology dictionary, 2020). However, laboratories for chemistry, physics and biology increasingly became sites of research in the 19th century.

Laboratory technology as a course is a branch of science that studies analytical laboratory procedures / laboratory-based investigations within biological, chemical, physical and life science areas. The science laboratory professionals are the laboratory technician and technologist. Both have been trained to man the laboratory. Their various but individual synergistic functions will be shortly spelt out.

A scientific laboratory technician support analysis, investigation, research and development.

He is involved in a variety of laboratory-based investigations within biological, chemical, physical and life science areas. He carries out sampling, testing, measuring, recording and analyzing of results as part of a scientific team. Their work plays an important role in the foundation stages of research and development (R&D) and in scientific

analysis and investigation. Also, he provides all the required technical support to enable the laboratory to function effectively. On the overall, the scientific laboratory technician carries out work that assists in the advancement and development of modern medicine and science. At the end of the day, a scientific laboratory technician carries out the work that allows scientists to concentrate on, and perform, the more complex analytical processes in the laboratory.

A science laboratory Scientist or technologist on the other hand differs from a technician in educational levels and responsibilities. On like the technician who just has a practical understanding of technology and a good knowledge of the general principles of the field he is in, a technologist is completely aware of various technologies. A technician works under a technologist.

First of all, when comparing their educational levels, a technologist will have a Bachelors' degree in most cases, while a technician will have a lower degree, or some kind of diploma certificate. Generally, a technician course will last for one to two years, whereas a technologist will have to undergo a course that lasts for four to five years.

Secondly when talking about the duties of a technologist, he has a wider range of duties. The technologist is the team leader, and his duties include research, analyzing, designing, conducting studies, resolving problems, interpreting situations, evaluating situations, developing prototypes and guiding the technicians. Another difference that can be seen, is that a technologist is solely responsible for innovative ideas, and the technician is responsible for the application of those ideas. Unlike technicians, technologists handle most of the more complex work in the laboratory.

The laboratory is a hazardous place to work; Laboratory workers are exposed to numerous hazards including chemical, biological, physical and biological hazards, as well as ergonomic and psychosocial hazards on a daily basis as they carry out their work.

Gupta (2010) states that a hazard is something that has the potential to cause harm to people, property and processes; hence it is any practice, behavior or condition or combination of these that can cause injury or illness to people or damage to property. A laboratory hazard can be defined as anything that has a potential to cause harm or damage to both human and property in the laboratory. Aptly put a hazard is simply the potential to cause harm (Eyayo, 2014). However, Asuzu (1994) defines a hazard as any substance, process or situation that predisposes to or itself causes accident or disease. This cannot be far from the truth as Achalu (2000) identified a link between hazard, accident and disease. The presence of hazard increases the risk of accident which in turn can lead to disease and/or disability. The emerging disease or disability can become a source of hazard to others (Amanze & Agu 2014). Thus, it is a situation, condition or thing that may be dangerous to the safety or health of workers (Achalu, 2000). That a hazard predisposes a person or property to danger, and the magnitude of the danger will depend on the nature of hazard and level of exposure to the hazard. Working in the laboratory like any other occupation exposes one to hazards.

Occupational hazards according to Onumbu (2008) are workplace or work related dangers, conditions or systems which have the potential to cause stress, injury or loss to the workers, employers or both of them. It can also be referred to as any activity, materials, processes or situation that is likely to cause an accident, injury or disease at the work place (Fasunloro & Owotade, 2004). An occupational hazard is anything that puts people or property at risk of harm or loss in the workplace while engaging in work related activities. These are setups or conditions in the work environment, or anything related to the job that can lead to harm or loss to either the employee or employer, or both of them.

Occupational hazards can be mainly categorized into five (5) namely: ergonomic, physical, chemical, biological and psychosocial hazard (Achalu, 2000 & Eyayo, 2014). Physical hazards include extremes of temperature, noise, vibration, light and radiation. Chemical hazards are particles, fibers, fumes, carbon black, metals and metalloids like mercury and arsenic, organic solvents, like benzene and inorganic gases like carbon monoxide and Sulphur dioxide. Ergonomic hazards include posture mismatch between man and machine, lifting of heavy load, repetitive manual tasks and failure of machine components. Biological hazards are living organisms like bacteria, viruses, fungi and protozoa.

As an old saying goes "knowledge is power", knowledge which is simply the fact of knowing about something is key in our everyday. Knowledge can come by learning, either from education or experience. Sadly, only a few people understand how critical it is to life. People may have a challenge with knowledge because of what it will cost them to obtain it.

Statement of the Problem

Laboratory science has its own risks. Laboratory workers face several job dangers and

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diseases. A healthy and safe workplace requires identifying and comprehending these dangers and the accidents and illnesses they may cause. Laboratory risks include chemical, biological, physical, ergonomic, and psychological. These dangers may cause allergies, burnouts, musculoskeletal injuries, and mental issues. Laboratory workers encounter physical, chemical, biological, ergonomic, and psychological dangers everyday. These dangers have left some workers permanently disabled.

Due to poor training on laboratory dangers and a lack of safety precautions, laboratory employees often incur injuries and losses unwittingly.

Due to the world's growing requirements and issues, more labs and lab personnel have been needed. This has increased laboratory dangers, accidents, infections, and injuries.

Charity starts at home, and colleges teach laboratory scientists. These training facilities are required to teach laboratory science students about lab dangers and safety precautions. Many labs still have accidents and injuries, thus many graduates still suffer these dangers. Laboratory workers "still appear" oblivious of workplace risks, making them more prone to accident. As the phrase goes, "you cannot provide what you don't have," thus these training institutions' laboratory specialists' occupational hazard awareness and safety compliance must be assessed.

Aim and Objectives of the Study

The aim of this study is to assess the level of knowledge of occupational hazards and compliance to safety measures among laboratory professionals in government universities in Rivers State.

Specifically, the study seeks to:

1. Ascertain the level of knowledge of occupational hazards among laboratory professionals in government universities in Rivers State.
2. Determine the level of compliance to safety measures by laboratory professionals in government universities in Rivers State.

Research Questions:

The following questions guided the study:

1. What is the level of knowledge of occupational hazards among laboratory professionals in government universities in Rivers State?
2. What is the level of compliance to safety measures by laboratory professionals in government universities in Rivers State?

II. Methodology

This study aimed to assess the level of knowledge of occupational hazards and compliance to safety measures among laboratory professionals in universities in Rivers State, Nigeria. The descriptive survey design was used, and data was collected from a representative sample of 401 laboratory professionals out of a population of 454. A structured questionnaire was used to obtain information on socio-demographic characteristics, knowledge of occupational hazards, and compliance with safety measures. The instrument was validated and found reliable (Cronbach alpha r=0.87). Data was analyzed using SPSS, and research questions were answered using percentage, mean, and standard deviation.

III. Results

Research Question 1: What is the level of knowledge of occupational hazards among laboratory professionals in three government universities in Rivers State?

Table 4.1: Knowledge of occupational hazards among laboratory professionals

SN	Items	$\bar{X}$	SD	Decision
	Knowledge of Physical Hazards			
1	Manual lifting or carrying of items heavier than 20kg at least 10times daily is hazardous	2.83	.955	High
2	Repeated exposure to loud noise in the work place can lead to hearing loss	2.71	.772	High
3	Extreme temperatures could cause bodily harm	2.66	.738	High
4	Vibration from machines and equipment affects health	2.79	.795	High
5	Vibration could cause disorder of the joints and fatigue	2.89	.825	High
6	Inadequate illumination could damage the eyes	2.63	.746	High
7	Radiations from radioactive substances could be emitted as the job is done and is hazardous	2.94	.863	High
8	Radiations can cause cancers, genetic mutations and sterility	2.55	.736	High
	Grand mean	**2.75**	**0.804**	High
Knowledge of chemical hazards				

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9	Working with chemical substances destroys the skin	3.65	.778	High
10	These chemical substances are poisonous	3.58	.669	High
11	Chemicals can be flammable, corrosive, carcinogenic, mutagenic or sensitizing or toxic	3.41	.615	High
12	These chemicals can be inhaled, ingested or absorbed into the body and cause harm	3.59	.791	High
13	Chemicals could affect the health when exposed to them for a long period of time	3.39	.599	High
14	Chemicals could cause damage or diseases to organs of the body	3.43	.621	High
15	Chemical hazards could lead to shortened life expectancy or death	3.54	.737	High
	Grand mean	**3.51**	**0.68**	High
Knowledge of ergonomic hazards				
16	Working in bent, twisted or awkward positions do not affect job	3.04	.977	High
17	Injuries or strain can arise from the design and organization of a workplace	3.77	.779	High
18	Working heights that are 2 metres or more above the floor does not affect the job	2.60	1.38	High
19	Ergonomic hazards could cause deformity of the body	2.07	.899	Low
20	Ergonomic hazard could cause back, neck, shoulder and body pain	2.27	.884	Low
	Grand mean	**2.75**	**0.98**	High
Knowledge of psychosocial hazards				
21	Psychological hazard can arise from workload which is overwhelming	2.07	.792	Low
22	There is risk of aggression or bullying from other employees at work which is hazardous	2.31	.927	Low
23	Psychosocial hazards can arise from threat or violent attacks from the public	2.29	.921	Low
24	Psychosocial hazards could cause hypertension, stress, peptic ulcer and mental breakdown.	2.06	.856	Low
25	Job roles are defined so workers do not feel uncertain and lacking job control.	3.73	.689	High
	Grand mean	**2.49**	**.837**	Low
Knowledge of biological hazards				
26	Micro-organisms like bacteria, viruses, fungi and protozoa can be found in some equipment and materials in the lab	3.78	.785	High
27	Biological hazards are microorganisms, cell culture or human endo-parasites.	3.78	.665	High
28	These organisms can cause acute and chronic infections to employees.	3.72	.725	High
29	Hazardous biological waste can be generated while working.	3.87	.774	High
	Grand mean	**3.78**	**.737**	High
	Overall	**3.05**	**.807**	High

Decision rule:

Table 4.1 shows the knowledge of occupational hazards among laboratory professionals in three government universities in Rivers State. The result shows that knowledge of occupational hazards was high among laboratory professionals as the overall average = 3.05±.807 was greater than the criterion mean = 2.5. among the different types of hazards, knowledge of chemical hazards ($\bar{X}$ = 3.51) was more followed by biological hazards ($\bar{X}$ = 3.05), physical and ergonomic hazards ($\bar{X}$ = 2.75) each and knowledge of psychosocial hazards ($\bar{X}$ = 2.49).

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Research Question 2: What is the level of compliance to safety measures by laboratory professionals in three government universities in Rivers State?

Table 4.2: Compliance to safety measures by laboratory professionals

SN	Items	$\bar{X}$	SD	Decision
1	Everyone receives the necessary workplace health and safety training when starting a job, changing jobs or using new techniques	3.84	.779	High
2	Pre- employment medical examination is done	3.91	.823	High
3	There is an active and effective health and safety committee	2.00	.840	High
4	Incidents and accidents are investigated to improve workplace health and safety.	2.00	.909	High
5	Systems are in place to identify, prevent and deal with hazards.	3.94	.848	High
6	Personal protective equipment such as gloves, face masks, e.t.c. are provided by management and it is adequate and appropriate.	3.64	.818	High
7	There is a proper waste disposal system in my workplace	3.70	.832	High
8	Communication about workplace health and safety procedures is clear to all workers	3.78	.805	High
9	Employer periodically sends employees for trainings to update and upgrade their efficiency and effectiveness	2.16	.913	High
10	There is an HSE policy that is duly signed by the supervisor in my workstation	2.08	.994	High
11	There is adequate training on hazard control measures in the workplace	2.01	.942	High
12	Periodic medical examinations are carried out	2.25	1.00	High
	Grand mean	**2.94**	**.875**	High

Table 4.2 shows the level of compliance to safety measures by laboratory professionals. The result showed that the grand mean = ($\bar{X}$ = 2.94±.875) is greater than the criterion mean = 2.5, indicating that there was a high level of compliance to safety measures by laboratory professionals.

IV. Discussion of Findings

The result shows that knowledge of occupational hazards was high among laboratory professionals as the overall average = 3.05±.807 was greater than the criterion mean = 2.5. among the different types of hazards, knowledge of chemical hazards ($\bar{X}$ = 3.51) was more followed by biological hazards ($\bar{X}$ = 3.05), physical and ergonomic hazards ($\bar{X}$ = 2.75) each and knowledge of psychosocial hazards ($\bar{X}$ = 2.49). The finding of this study is not surprising because the study was conducted laboratory professionals who are enlightened about vast health issues to a large extent hence, they were found to be knowledgeable about occupational hazards. The finding of this study is similar to that of Gupta (2010) which states that a hazard is something that has the potential to cause harm to people, property and processes; hence it is any practice, behavior or condition or combination of these that can cause injury or illness to people or damage to property. The finding of this study is in keeping with Amanze and Agu (2014) where it was noted that the presence of hazard increases the risk of accident which in turn can lead to disease and/or disability. The emerging disease or disability can become a source of hazard to others. The finding of this study is also in line with that of Eyayo (2014) which showed that an occupational hazard is anything that puts people or property at risk of harm or loss in the workplace or while engaging in work related activities. These are setups or conditions in the work environment, or anything related to the job that can lead to harm or loss to either the employee or employer, or both of them, which can be mainly categorized into five (5) namely: ergonomic, physical, chemical, biological and psychosocial hazard.

The result showed that the grand mean = ($\bar{X}$ = 2.94±.875) is greater than the criterion mean = 2.5, indicating that there was a high level of compliance to safety measures by laboratory professionals. This finding is encouraging because it shows that the good knowledge they have on occupational hazards was not in vain as they took action to adopt safety measures which can help in averting the effect of the hazards on the health of the laboratory professionals. The finding of this study is in line with that of Adebola (2014) which showed that majority of the respondents comply with safe work practices, and high proportion of have compliance with safety

procedure. The findings of this study is also in support of that of Jasani, Joshi, Kartha, Mehta, and Shah (2016) which showed that the respondents adopted safety measures to reduce their exposure to the occupational hazards inherent in their work.

V. Conclusion

Based on the findings of the study, it was concluded that knowledge of occupational hazards was high and there was a high level of compliance to safety measures among laboratory professionals in government Universities in Rivers State.

VI. Recommendations

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

1. The ministry of health should design and implement safety training and retraining programmes for laboratory professionals to sustain the high level of safety compliance found among them.
2. The laboratory professionals should also not relent in their effort to get enlightenment on the occupational hazards associated with their job by continuous search for relevant information through different channels, this will make them get acquainted with emerging hazards and how to control them.

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