Evaluation of Occupational Hazards among Workers in Selected Abattoirs in Port Harcourt.

ABSTRACT

Aim: The study aimed at investigating the occupational hazards among abattoir workers in selected abattoirs in Port Harcourt.

Study Design: A cross-sectional survey was carried out in order to determine and evaluate the prevalent occupational hazards that abattoir workers were exposed to using a well-structured questionnaire. Three abattoirs were randomly selected for the study which involved abattoir workers, randomly picked from three different abattoirs in Port Harcourt. The study was conducted using a well-structured questionnaire and 140 respondents participated in the study.

Methodology: Five categories of occupational hazards namely physical, biological, ergonomic, psychosocial and chemical hazards were investigated. Z-test analysis was carried out to determine if there existed any significant impact posed by these hazards and the results of the analysis showed that the hazards were significant among abattoir workers. In addition, the data obtained was also analyzed using the Analytical Hierarchical Process (AHP) in order to rank the prevalence of these hazards posed to abattoir workers.

Results: Biological hazard was ranked as a Class 1 hazard with a 71.53% percentage occurrence. This was closely followed by ergonomic and physical hazards ranked as Class 2 hazards with percentage occurrences of 64.29% and 54.28% respectively. Psychosocial hazard was ranked as Class 3 hazards having a percentage occurrence of 60.95% while chemical hazard was ranked as Class 4 hazards with a percentage occurrence of 35.24%.

Conclusion: This study thus confirmed the presence of the aforementioned hazards as critical in influencing abattoir workers. It was therefore recommended that abattoir workers be trained to increase their level of awareness and knowledge of these occupational hazards in order to protect their health and safety at work.

Keywords: Abattoir, Analytical Hierarchical Process, Occupational Hazards.

1. INTRODUCTION

Health and safety is an issue of great concern especially in the workplace. It has a great socio-economic impact not only on the workers and employers but also on the economy of the country. The health and safety of employees in the workplace is of utmost importance to the employers, trade union and the government which is the reason why these units have been doing their best by working hand in hand to ensure that occupational health and safety concerns are given top most priority by continuously taking actions to deal with such issues. The workplace has become increasingly unbearable and workers are exposed constantly to stress, noise, dusts, poisonous chemicals, pathogens which are hazardous to their health. Nonetheless, employers have still not taken occupational health and safety as a top priority [1].

Occupational health and safety deals with the promotion and adequate maintenance of the total well-being of the worker and also the proper maintenance of an accident free workplace [2]. Also, the well-being of family members, employers, customers, and many others who might be in close proximity to the workplace environment are still part of what occupational health and safety tries to achieve. Work is very necessary and essential to people's lives and the survival of the family and society depends on it. Workplace hazards or occupational hazards are a major cause of disability and mortality among the working population globally [3]. The WHO (1999) [4] report spotted occupational hazards as the 10th leading cause of accidents and injuries in the workplace. According to WHO (1994) [5], majority of diseases from selected occupational hazards were estimated to be approximately 1.5% of the global concern in terms of disability and lost time injuries among workers. Furthermore, the WHO (1997) [6] reported that about 75% of the present global labor force is in the developing countries of which 50- 70% of this population are more likely to be exposed to poor working conditions in the workplace or heavy physical workloads, involving manual lifting and moving of heavy items, or carrying out repetitive functions.

In Nigeria, the development and growth of livestock production has been on the increase and has guaranteed a steady supply of animals meant for butchering and processing both for consumption and other uses by humans. The abattoir industry in Nigeria has experienced tremendous growth and has contributed significantly to the gross domestic product (GDP) of the country [7]. As Nigeria’s population keeps increasing, there is an increase in demand for meat of which the abattoir (which is a designated place for slaughtering of animals) has become highly known and very popular for churning out meat in large quantities to satisfy this demand [8]. Tekki et al (2012) [9] pointed out that animals which are commonly slaughtered in abattoirs include cattle (beef), sheep (lamb and mutton), goats, and poultry. Beef produced from the

butchering and processing of cattle are good sources of protein, the bones and blood of the cattle are sold to poultry farm owners for feed millers to be processed into bone and blood meal respectively for their birds. The horns and hoofs are used in the production of fertilizers and buttons while the hides and skin popularly known as “ponmo” in Nigeria are further processed and used in the production of shoes, wallets, belts and watch straps amongst others as reported in a market research by Adeyemo, 2002 [10]. As a result, abattoir workers popularly known as “butchers” are continuously exposed to occupational hazards due to possible and inherent physical, hazardous chemical, biological and/or ergonomic agents in their work place (Banjo et al., 2013) [11] as they are constantly in contact with live animals, their carcasses, blood and body fluids [12]. Close association and proximity of workers to these animals, which usually display rough and unruly behaviours, increases the exposure of these abattoir workers to safety hazards and also renders them susceptible to various health hazards. Other activities that might expose these workers to occupational hazards include receiving and holding of livestock, butchering of animals, carcass dressing of animals, carcass boning and packaging, handling of animal blood, burning and drying of hides and skins, transport and trade of processed material and handling of wastes generated from the processing of animals. These wastes can either be solid or liquid. Sources of solid wastes generated from abattoirs include faeces from animal holding, slaughter and processing areas, unwanted hides and skins, unwanted carcasses of animals. Sources of the liquid wastes are mainly the water used in processing slaughtered animals [13]. Many of the activities in most abattoirs are carried out using manual tools and equipment and these activities involve a lot of physical, chemical, biological, ergonomic and psychological strains which in turn create health problems for the workers. For example, the tools and techniques used may either be defective in design or do not suit the workers and invariably lead to various occupational hazards like injury, fatigue, exhaustion, etc. The health of the workers can also be subjected to risk due to stress, zoonotic diseases, allergies, musculoskeletal disorders, exposure to varying weather conditions, contact with animal dung, and skin diseases from processing these animals.

The high rise of communicable and zoonotic diseases such as Tuberculosis, Cysticercosis, Trichinosis etc. among public health are also indicators to the presence of occupational hazards in our abattoirs and slaughterhouses according to Nwanta et al (2008) [14]. Adedeji et al (2011) [15] and Olowogbon,(2011) [16] have published and documented researches on various occupational hazards among abattoir workers. Adelegan (2002) [17] and Abiade et al (2006) [18] through their published studies have also documented various health hazards that workers

might be exposed to from improperly managed abattoir waste during and after animal processing. Despite the fact that various studies have investigated the occupational hazards among these workers, there is still inadequate information on occupational hazards among abattoir workers in Port Harcourt where there is an increasing demand for meat daily.

METHODOLOGY

2.1 STUDY AREA

The study was conducted in Port-Harcourt, Rivers state, Nigeria. Port-Harcourt is the capital of Rivers state and the largest city. It is located in the Niger Delta region with an estimated population of 1,865,000 inhabitants according to a research done by Arizona-Ogwu in 2011 [19]. Port-Harcourt lies within 4.777^{o} N, latitude and 7.013^{o} E, longitude and is elevated 16m (52ft) above sea level. Port-Harcourt which is the largest city in Rivers state is known as an industrialized area with many oil industries located there. The city is also booming with many businesses which are continuously springing up daily including the business of buying and selling of meat and meat products from abattoirs daily. Three abattoirs namely Choba, Alakahia and Rumuosi were randomly selected for the study. The map of Port-Harcourt is show in Figure 1.

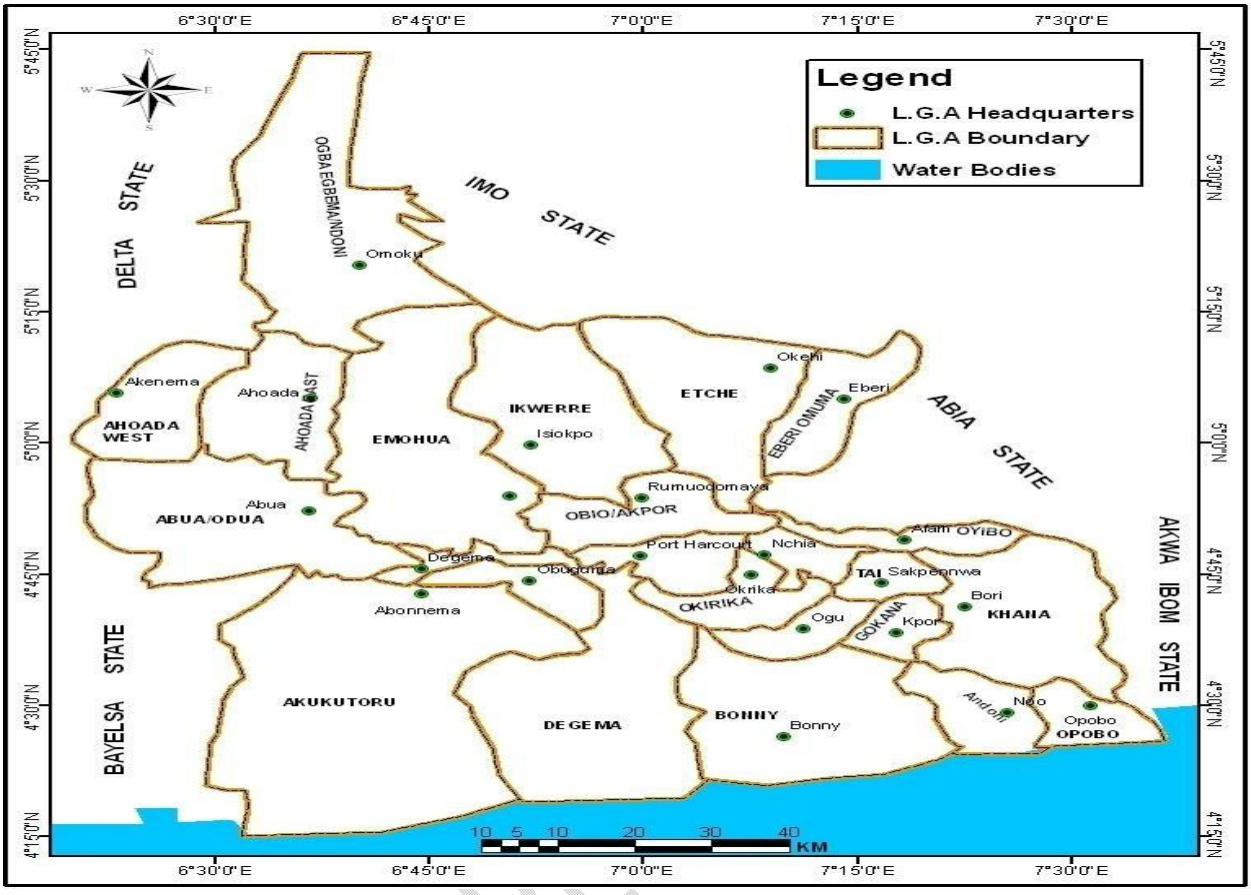

Figure 1: Map of Rivers State Showing the Local Government Areas

2.2 Population for the Study

Abattoir workers that comprised all animal handlers from three different abattoirs made up the population for the study. Animal handlers were used because they were actively involved in various activities (slaughtering, cutting, skinning, roasting etc. of animals) that directly exposed them to occupational hazards in the abattoir. All the workers that were administered questionnaires gave their consent.

2.3 Sample and Sampling Techniques

Sampling was carried out for 140 abattoir workers. Sample size was determined using Taro Yamane's formula and is given in Equation 1 as

$$n = \frac{N}{1+N(e)^2} \qquad (1)$$

Where:

N= population size

n= sample size

e= level of significance

For the purpose of this study,

N= 216, e= 0.05

Therefore;

$$n = \frac{216}{1+216(0.05)^2}$$

$$n = 140$$

The questionnaire administered was designed to evaluate various hazards that abattoir workers are exposed to by ranking the hazards into their various categories of physical, chemical, biological, ergonomic and psychosocial, alongside the risks associated with exposure to these hazards.

2.4. Methods of Data Analysis

Data analysis was carried out using the Analytical Hierarchical Process (AHP) and Excel to determine the significance of the hazards. The questionnaire was thoroughly examined to check the accuracy and consistency of the data obtained using the AHP method of analysis. Different rankings of the classes of occupational hazards were also obtained using the AHP method to determine the most prevalent hazards that abattoir workers are exposed to.

2.5 Statistical Analysis

Means were subjected to Two-sample t-test and z-test for comparisons of the different categories of occupational hazards and the associated risks that abattoir workers are exposed to. This was done with the statistical package of XLSTAT. Significance level was set at p values <0.05. The results were expressed as Mean ± SD.

3. RESULTS AND DISCUSSION

3.1 Analysis of occupational hazards, health and safety awareness, sanitation and hygiene culture of respondents.

The different answers to questions on the level of awareness of abattoir workers to occupational hazards and health and safety awareness, sanitation and hygiene culture in the abattoir are shown in Table 1

Table 1: Occupational hazard and health and safety awareness, sanitation and hygiene culture of respondents

Questions	Yes	% Yes	No	% No
Knowledge of occupational hazard	28	5	112	15
Idea of hazards exposed to	28	5	112	15
Any training on occupational hazards	14	2	126	16
Environment cleaned before/during/after work	140	22	0	0
Are animals inspected before slaughtering	140	22	0	0
Is there a first aid box in the abattoir	0	0	140	18
Is there a supervisor present	140	22	0	0
Is there a treatment facility in the abattoir	0	0	140	18
Use of chemical for meat preservation	0	0	140	18
Do you have a toilet and washroom in the abattoir	140	22	0	0

The results from data obtained show that majority of the workers have poor knowledge of occupational hazards (5%) and training (5%) on hazards they might be exposed to. Also, there is no first aid box in the abattoir (0%) and no treatment facility (0%) whatsoever. However, all respondents indicated that their work environment is cleaned regularly (22%), animals are inspected before slaughtering (2%), they have a supervisor who oversees the affairs in the abattoir (22%) and they have a toilet and bathroom in the abattoir (22%). The percentage number of respondents who answered “yes” to questions on occupational hazard and health and safety awareness, sanitation and hygiene culture in the abattoir is shown in Figure 2 while the percentage number of respondents who answered “No” is shown in Figure 3.

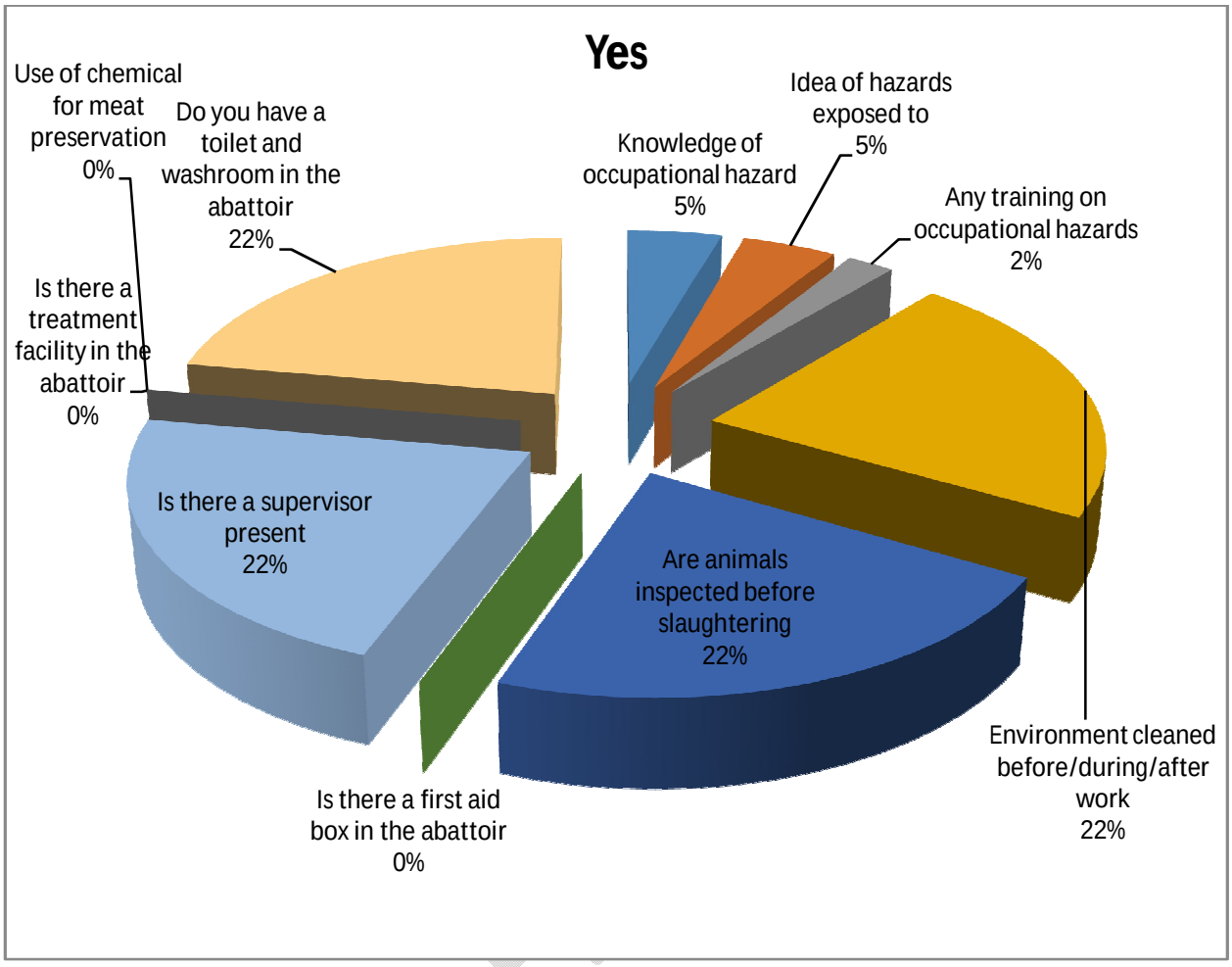

Figure 2: Respondents who answered "yes"

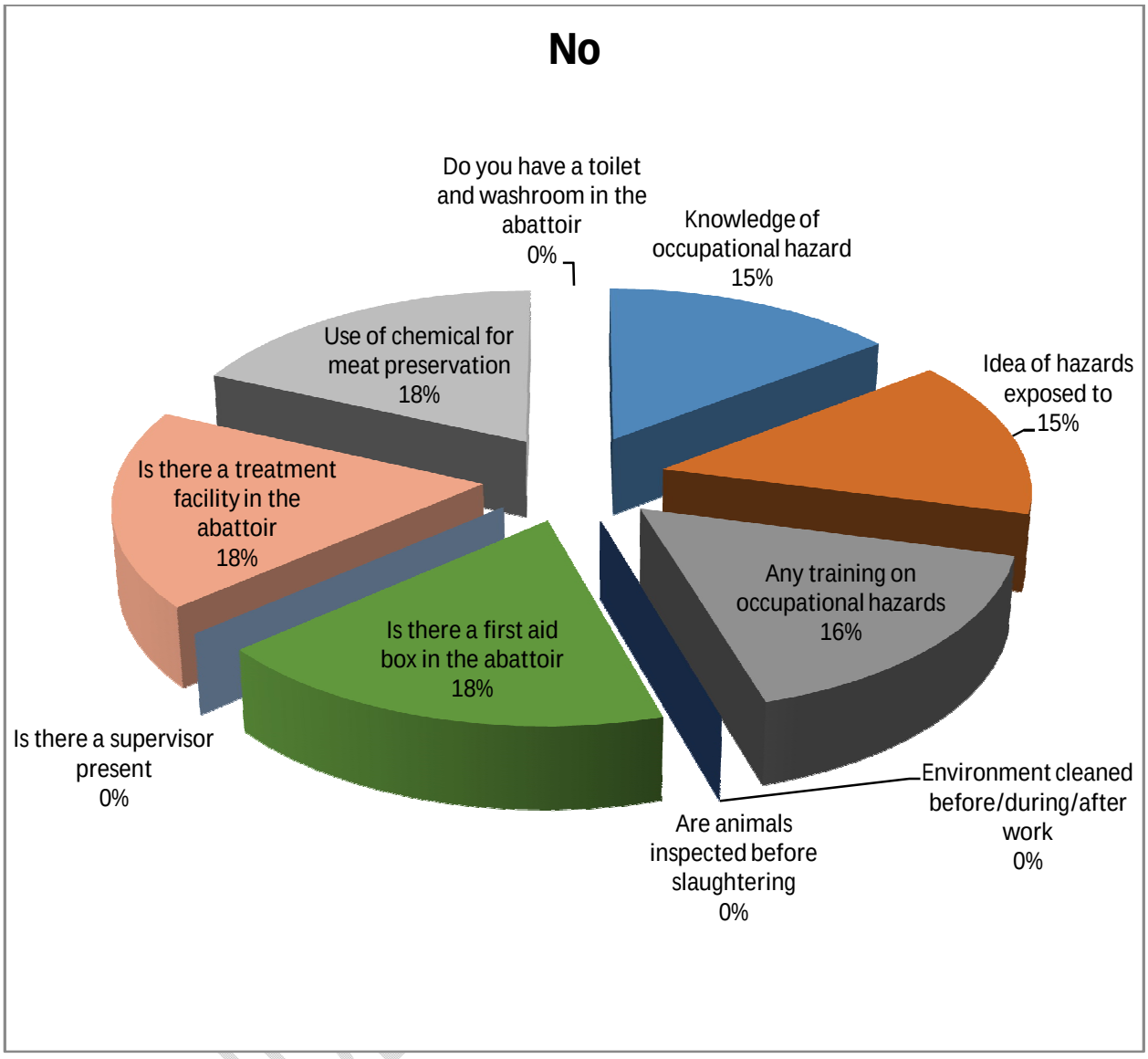

Figure 3: Respondents who answered "No"

From the results of the data obtained from respondents on their sanitation culture in the abattoir, it can be seen that sanitation is taken seriously by workers and is done every day as all workers agreed to this. This is shown in Figure 2.

3.2 The AHP analysis of Hazard factors

The Analytical Hierarchical Process which was introduced by Thomas Saaty in 1980 [20] is an effective analytical tool that deals with complex decision making and helps the decision maker to make the best decision. This process deals with complex decision making by reducing the complex decision to a series of pairwise comparisons and brings out results. The tool uses a technique for checking the consistency of the decision maker's evaluations which helps in

reducing the bias in the decision making process. The AHP analysis of the results from data obtained was carried out through a series of steps which are discussed below.

3.2.1 Hazard Data Validation and Consistency Check

Hazard data validation and consistency check is done to ensure that the decision arrived at in this research is consistent and coherent. The hazard factors are grouped into five (5), as presented in Tables 2 and 3.

Table 2: Hazard factors, percentage of occurrence and level of impact

Hazard Factors	**Percentage Probability of occurrence of Impact**	**Level of Impact**
Physical	54.28	56.2
Chemical	35.24	12.86
Biological	71.43	52.86
Ergonomics	64.29	46.67
Psychosocial	60.95	14.76

Table 3: Assessment tabulation of the probabilities of occurrence and of the level of impact

Impact Factors		Percentage of Impact						Level of Impact		
	0-20%	21-40%	41-60%	61-80%	81-100%		Low	Medium	High
Physical			xxxxxxx					xxxxxxx	
Chemical		xxxxxxx					xxxxxxx		
Biological				xxxxxxx				xxxxxxx	
Ergonomics				xxxxxxx				xxxxxxx	
Psychosocial			Xxxxxxx				xxxxxxx		

The process used to validate the data acquisition involves the use of the Analytical Hierarchical Process (AHP). Uzoigwe et al, 2023 [21] shows a detailed study on consistency ratio analysis formulae and procedure.

The consistency ratio value of 0.0862 was obtained using the AHP analysis and the value is in agreement with the analytical hierarchical process standard of < 0.1 consistency. This means the decision matrix obtained from the judgment of experts was correct, as regards to the pairwise comparison. More so, the percentage ratios of the hazard factors put together were of standard value.

The AHP analysis carried out in the study ranked the hazards and classified them according to their prevalence in the abattoir work environment as shown in Figure 4 below. The analysis ranked biological hazards as the most prevalent, classified as class 1 hazard, ergonomic and physical hazards as class 2 hazards, psychosocial as class 3 hazards and chemical which was ranked the lowest as class 4 hazards.

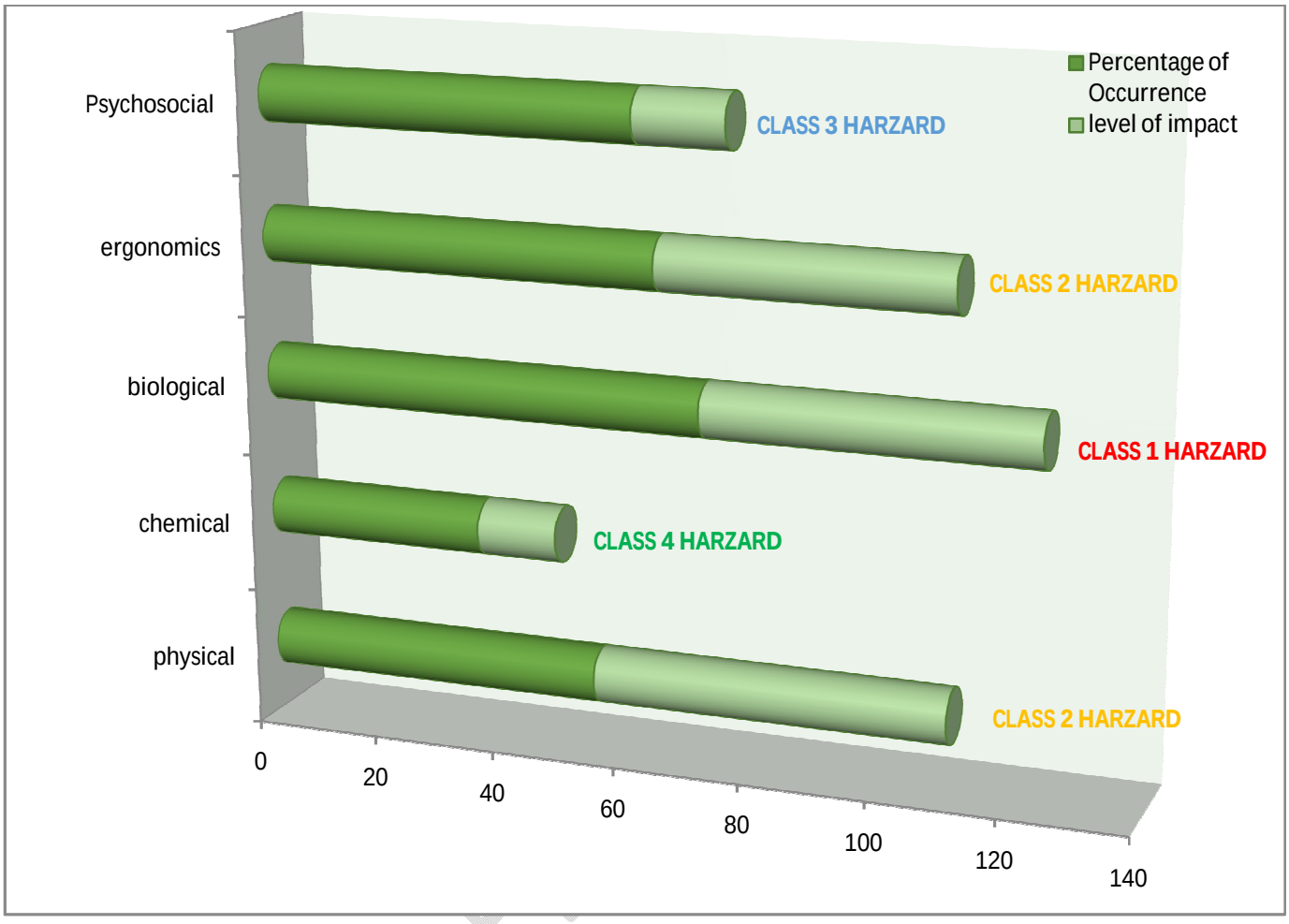

Figure 4: Bar Chart Relationship of Various Hazard Factors With Respect To Level of Impact and Percentage of Occurrence

A summary of statistical analysis results for all hazard factors is as presented in Table 4.

Table 4: Z-test analysis results of the hazard factors

Hazard factors	Z-test analysis results (calculated)	Critical value of z at 0.05% level of confidence = ± 1.96
Biological hazard	4.457	1.96
Ergonomic hazard	3.984	1.96
Physical hazard	4.257	1.96
Psychosocial hazard	4.812	1.96
Chemical hazard	3.642	1.96

3.3 Discussion

The respondents in this study were all males which indicates that abattoir work is viewed as an occupation for men only and not for women. This is in line with the study carried out by Gali et al (2020) [22].This indication might be due to the nature of work involved in the abattoir as it is deemed a very strenuous activity. The age groups of the respondents ranged from 16-45 years. This shows that mostly young men are engaged in this occupation, this can also be attributed to the nature of work involved as strength and vigour is required for this occupation. It can be seen from the study that the respondents did not have proper and formal education as most of them stopped school at the secondary level (64%), only 2% went to a tertiary institution. These findings also agreed with studies done by Olowoporoku (2016) [23] who indicated that most of the abattoir workers were not well educated. This was a major challenge as most of them could not read and write. All respondents were butchers as butchers are the ones who are directly involved in activities that pre-dispose them to occupational hazards. According to Abdullahi et al (2016) [24], occupational hazards are the major source of morbidity and mortality among butchers due to exposure to many hazardous situations in their daily practices. Nguyen et al (2018) [25] also indicated in their study that workers are exposed to various occupational hazards in the workplace. The amount of years worked by the respondents ranged from 1 to 20 years of which majority (50%) of the workers have worked for 6 to 10 years which indicates that duration of exposure to occupational hazards is high. All respondents indicated that 5 hours was the maximum time spent in the abattoir daily as their work starts by 6 am and ends 11am as observed by the researcher. This can be attributed to the fact that the major buyers are meat sellers who come very early in the morning to buy meat and go back to their shops to sell. Only 5% of the respondents had knowledge of occupational hazards which shows that the level of awareness of occupational hazards among abattoir workers is very low. This was similar to the study carried out by Ilo et al (2021) [26], which revealed that abattoir workers in Anambra State had low level of knowledge of occupational health hazards associated with their work place. This may be due to neglect from government or individuals who own abattoirs in ensuring that these workers are trained to understand the risks associated with their jobs and how to protect themselves from such risks. Also, respondents indicated that they have not received any training or had any sensitization on occupational hazards as only 2% of them attested to having received training. Training personnel about occupational health and safety hazards in meat handling is essential to improving conditions in abattoirs and to reduce bacterial contamination of meat and disease exposure in workers [27]. However, all respondents affirmed that their work environment is cleaned regularly during and after each day's work. They also attested to the fact that animals are inspected daily before slaughter although the researcher could not see the

veterinarian on ground throughout the period of the study. A supervisor was on ground to oversee affairs in the abattoir daily as claimed by the respondents. On the issue of having a first aid box in the abattoir, all respondents indicated that there was no first aid box. Also, there was no treatment facility in the abattoir either for the workers or the animals. This indicates that if a worker is injured, he has to go outside the abattoir to get medical attention, this defeats the aim of occupational health which is to ensure the protection of the overall well-being of workers in the workplace. However, respondents indicated that they do not make use of chemicals for preservation of meat as 18% of them attested to this fact. All respondents claimed that there is a toilet and wash room for them to clean up when the need arises, although they have only one which is not enough when compared with the number of workers in the work environment. All respondents indicated that sanitation is done very often in the abattoir although the researcher observed that the waste generated from the abattoir is not properly disposed of as the workers themselves said they dispose of waste in bushes close to their workplace. 64% of respondents indicated that they wash their hands very often, this implies that hand washing culture needs to be improved as 36% of the respondents wash their hands less often. Hand washing is predominantly used to protect meat from contamination, but also protects workers against directly transmitted bacterial pathogens such as *Salmonella sp* [28]. It was observed by the researcher also that bore hole was the source of water supply in the abattoir and respondents attested to this.

Abattoir workers are exposed to various occupational hazards ranging from cuts, kicks from animals to zoonotic diseases, allergies and so on which have been classified in this study into the five major classes of hazards. The z-test carried out indicates that all the hazards discussed in this study are significant among abattoir workers in Port-Harcourt. The AHP analysis also pointed out the significance of these hazards and ranked them according to the order of their prevalence. Biological hazards was ranked as class 1 having the highest percentage of occurrence (71.43%) and level of impact (52.86%), ergonomic and physical hazards were ranked as class 2 hazards having percentage occurrences of 64.29% and 54.28% and level of impact, 46.67% and 56.2% respectively. Psychosocial hazards was ranked as class 3 hazards with percentage occurrence of 60.95% and level of impact 14.76% while chemical hazards was ranked as class 4 hazards having a percentage occurrence of 35.24% and level of impact 12.86%. Previous studies have shown that abattoir workers are more exposed to physical hazards than biological but this study indicates the prevalence of the biological as higher when compared to physical hazards which can be attributed to the fact that these abattoir workers are more aware of the physical hazards and try to prevent themselves from them whereas they are

unaware of the biological hazards which tend to have more serious consequences as a result of exposure of the workers to them. Certain activities that may expose abattoir workers to biological hazards include unprotected skin contact with the body fluids like blood, faeces, urine and skin of infected animals which can likely result to zoonotic diseases, infections and allergies [11]. Exposure to ergonomic hazards can be due to manual lifting of animals, frequently bending to work, prolonged standing, repetitive functions and awkward postures while working according to Harmes et al (2016) [7]. Harmes et al (2016) [7]also pointed out that workers may be exposed to physical hazards due to knife cuts, wounds and bruises from equipment, kicks from animals, high level of noise, poor illumination etc. Hendrix and Brooks (2017) [29] pointed out from their study that exposure to psychosocial hazards may be due to violence or bullying at work, stress or fatigue, work overload, lack of support from family and friends etc. Chemical hazards exposure arises from the use of chemicals either for preserving meat or other sanitation activities [24]. In this study, it was discovered that the three abattoirs visited do not make use of chemicals and as such, exposure to chemical hazards were low.

4. CONCLUSION

Meat and meat products are highly consumed daily which explains the reason why animals are constantly slaughtered to meet the various needs of consumers. Abattoir workers in the course of doing their jobs are exposed to various occupational hazards. The study identified various occupational hazards that these abattoir workers are exposed to due to the nature of their work which entails close contact with animals. The level of awareness of abattoir workers to these hazards is very low. The occupational hazards identified were the physical, biological, ergonomic, psychosocial and chemical hazards of which all were discovered to be significant among abattoir workers. Necessary measures must be put in place to ensure that these workers carry out their jobs in a relatively safe and healthy environment so as to protect and preserve their general well-being in the workplace.

Abattoir workers are exposed to occupational hazards daily as they carry out their activities. It is therefore imperative that the following be done to improve and protect the health and safety of the workers in the abattoir environment.

1 The government and private abattoir owners should ensure that abattoirs are allocated large expanses of land so that they can have space to build facilities such as clinics, standard toilets and washrooms and slabs for slaughtering animals.

2 Management in charge of abattoirs should ensure that workers embrace safe working procedures which will help reduce occurrence of these hazards.

3 Abattoir workers should be properly trained and made to know the occupational hazards they are exposed to and how to prevent them.

4 Government should ensure enforcement of laws to guide abattoir practice in Nigeria which will encompass sanitation, hygiene and occupational hazard awareness.

5 Stringent measures should be put in place by the government and management of abattoirs to ensure adequate and proper use of PPEs by workers to reduce exposure to these hazards.

6 Immunization both for the workers and animals should be encouraged and done as at when due to reduce zoonotic diseases and other illnesses.

7 Constant monitoring and surveillance should be done to check mate workers in abattoirs.

8 Stringent measures should be put in place to punish defaulters.

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