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KNOWLEDGE OF OCCUPATIONAL HAZARDS AMONG WELDERS IN RIVERS STATE

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Abstract
This study investigated knowledge of occupational hazards among welders in Rivers State. This study aims to determine the level of knowledge of occupational hazards among welders in Rivers State. The descriptive cross-sectional research design was adopted for the study of a population of 2,718 welders in Rivers State from an official source. A sample size of 810 welders, drawn using a proportionate random sampling technique took part in the study. Cronbach Alpha Coefficient test was used for the reliability of the instrument and a reliability of 0.86 was got. The data collected were analyzed using percentages to answer the research questions whereas Chi-square was used to test the hypotheses. The findings of the study showed that the level of knowledge about occupational hazards of the welders was relatively high in the categories. The findings also revealed that there were significant differences in knowledge of occupational hazards among the welders based on age, work experience, and level of education at $p<0.50$ respectively. It was recommended, among others, that there should be increased involvement of healthcare providers in the provision of safety devices and knowledge dissemination to the welders in Rivers State.

Keywords: Knowledge, Occupational hazards, Occupational risks, Welders.

Introduction

Hazards are unpleasant to anyone. A hazard may kill, it may be toxic or it may denature persons or substances. Occupational hazards, therefore, are conditions, circumstances or substances in a work environment which have the potential of causing disturbance, harm or loss to the worker or his property or both of them. Oftentimes, occupational hazards may affect both living and non-living things in the work vicinity. Onumbu (2022) declared that every profession, trade or occupation has its peculiar risks and hazards, some of which are interrelated across various work boundaries. Occupational risk is a combination of the probability that a specific something harmful or unpleasant may occur in future and the consequence of such an occurrence when certain actions or inactions are displayed in a workplace. Such risks in workplaces occur as accidents, injuries, diseases, damage to property, discomfort, loss of property and loss of lives. World Health Organization (WHO, 2010) stated that about 2 million people die each year as a result of occupational accidents and work-related illnesses or injuries. These occupational risks are end-points of unmanaged or improperly-managed hazards in workplaces. Doing work in itself could be summarized as taking a risk.

Knowledge of occupational hazards is a likely determinant of the worker's attitude towards the management of these hazards and possible prevention of the same. Knowledge of occupational hazards comprises the awareness and consciousness of practices or things that may cause a disturbance, harm or loss in a workplace. It entails being apprehensive of the inherent hazards and attendant risks in a workplace and work practice. In the construction industry, welding is known to be one of the most dangerous trades in the world today due to its notable high pedigree of incidences of accidents and fatality rates, which are all caused by occupational hazards (International Labour Organization, 2012; Tadesse et al., 2016).

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In every place where we see welders, they remind us of workers whose eyes are endangered daily by the blaze of fire while they gaze daily at the fire. As if they were not done yet, the tinkering, hammering, and cutting work style does not often keep them lucky enough to be safe in their trade. In the course of doing their work, welders engage in filing, bending, hammering, sandpapering, and even painting their metal stocks, among others. Therefore, welders are hereby defined as "workers who fit, file, join, or shape metallic materials by the application of heat or some other source of pressure". As a result, therefore, welders face a whole lot of prevailing hazards which are seriously debilitative and deleterious to their health and may lead to their death. They work in danger!

Sabitu et al. (2009) reported that there are three classes of welding in Nigeria, which include oxyacetylene fuel (gas) welding, Arc (electric) welding, and robotic welding. These welding processes involve the release and inhalation of some noxious metal fumes and particulates into various internal organs of those in the workplace. These metal fumes contain cocktail and other alloys like Zinc (Zn), Copper (Cu), Cobalt (Co), Nickel (Ni), Chromium (Cr), Platnium (Pi), Acetylene, Lead (Pb), Iron (Fe), Manganese (Mn), Cadmium (Cd), Arsenic (As) and some other oxides which may lead to acute and chronic cardio-respiratory problems or even death (Singh & Anand, 2013; Jain & Rao, 2015; Balthazar, et al., 2018). Jain and Rao (2015) asserted that "it is difficult to escape from welders' fume effects in welding places". These metal fume gas effects are also called "aerodispersoid complexes", according to Balthazar et al. (2018) and they are responsible for various health challenges confronting welders such as Brooks Syndrome, airway irritation and some other chronic diseases like bronchitis, pneumoconiosis or lung cancer, central nervous system (CNS) cancer, asthma and reduced lung functioning (Chauhan et al., 2014).

Traumatic ocular injury and irritation are the most visible and perpetual occupational health and safety infirmities associated with welders. Welders also suffer from Actinic Skin Disease (ASD) due to thermal burns on their skin in the workplace. During a welding process there is an interplay of radiants like visible light, infra-red ray (IR) and ultra-violent ray (UV) into the unprotected eyes of the cornea and retina (Sadiq, et al., 2018). Other occupational risks facing welders as a result of exposure to inherent occupational hazards in welding are gene mutation due to electromagnetism on the individual, lacerations and pierces from sharp objects, an explosion from gas cylinders; which may lead to death, heavy noise pollution from machines and vibration which cause hearing impairment. Knowledge levels among welders in Rivers State on their occupational hazards may go a long way to determining their safety approaches to work. Bhumika et al. (2014) reported that knowledge of occupational hazards varied greatly among the welding workers in South India; the same situation may also exist among the welders in Rivers State. However, this disparity may be prevalent across the socio-demographic lines of age grades, level of education (formal education), and levels of work experience.

Statement of the problem

It is common knowledge that primary healthcare agents in the state provide little or no knowledge of occupational hazards for welders in particular, and there is also a paucity of studies from both scholars and organizations on this area of knowledge in Rivers State. It is also believed that the little knowledge some welders have may vary on a socio-demographic scale. Looking at the vicinities of construction industries, it was observed that many welders did their jobs without practising appropriate safety procedures. These practices were deleterious to their health as some were reported to have abandoned their jobs due to job-related health challenges. The economic impact of abandonment of a skilled job among the youths in Rivers State cannot be over-emphasized at this point. In light of the above, this study investigated knowledge of occupational hazards among welders in Rivers State based on their socio-demographic determinants.

Aim and Objectives of the study

This study aims to assess the socio-demographic determinants of knowledge of occupational hazards among welders in Rivers State, to add to the pool of knowledge and make necessary recommendations to stakeholders. This study among other things was structured on the following objectives:

1. Assess the level of knowledge of occupational hazards among welders in Rivers State based on age;
2. Determine the level of knowledge of occupational hazards among welders in Rivers State based on work experience.
3. Investigate the level of knowledge of occupational hazards among welders in Rivers State based on the level of education.

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Research Questions

The following questions were posed to guide the study and provide possible solutions to the problem under investigation;

1. What is the level of knowledge about occupational hazards among welders in Rivers State based on age?
2. what is the level of knowledge about occupational hazards among welders in Rivers State based on work experience?
3. What is the level of knowledge of occupational hazards among welders in Rivers State based on their level of education?

Hypotheses

The following hypotheses were tested in the study at a 0.05 alpha level.

1. There is no significant relationship between age and knowledge of occupational hazards among welders in Rivers State.
2. There is no significant relationship between years of work experience and knowledge of occupational hazards among welders in Rivers State.
3. There is no significant relationship between the level of education and knowledge of occupational hazards among welders in Rivers State.

Materials and Methods

Research Design: The research design that was employed for this study is a descriptive – cross-sectional survey research design; using both qualitative and quantitative methods of enquiry. The study was conducted in Rivers State, Nigeria, which comprises 23 local government areas of the Niger – Delta region, namely Port Harcourt, Obio/Akpor, Ikwerre, Emohua, Etche, Omuma, Ahoada-East, Ahoada-West, Ogba/Egbema/Ndoni, Abua/Odual, Okrika, Eleme, Tai, Ogu-Bolo, Gokhana, Khana, Asari-Toru, Akuku-Toru, Degema, Bonny and Andoni/Opobo/Nkoro Local Government Areas

Participants: The population for the study was 2,718 identified welders according to the current register of the Government Craft Development Centre, Port Harcourt (2018). This population is made up of all male welders in the 23 local government areas of Rivers State. The initial sample size for the study consisted of 349 male welders which was determined by using Taro Yamene's formula for the calculation of sample size for a large population. It was later increased to 810 respondents to reduce sampling errors. A multi-stage sampling procedure was further adopted to arrive at the sample size.

Instrumentation: The instrument for data collection was a structured questionnaire which is titled "Socio-Demographic Determinants of Knowledge of Occupational Hazards among Welders Questionnaire (SDKOHWQ)". The item response patterns in this section were in a true or false response format. To ascertain the reliability of the instrument, twenty (20) copies of the questionnaire were pre-tested on practising welders in Bayelsa State which was outside the sampled area to determine the reliability co-efficient of the two sections of the instrument before commencing the study. The reliability coefficient of the instrument was determined by using the Cronbach Alpha formula and the internal consistency of the items was found to be 0.86. According to Chauhan, et al. (2014), when a reliability coefficient is above 0.60, it is considered reliable. Therefore, since the reliability coefficient for all the actions in the instrument was above 0.60, the present study is considered reliable. The researchers were assisted in this study by the use of four (4) trained research assistants. The research assistants were tutored on how to adopt an interactionist administration approach by personally distributing copies of the instrument to the respondents and retrieving the same on the spot to obtain a total of 810 copies of the instrument.

Data Analysis: Data collected were entered and recorded in the Statistical Package for Social Sciences (SPSS) version 23. Data were analyzed by using descriptive statistics of percentage for the research questions, while Chi-square was used to test null hypotheses at a 0.05 significance level.

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Results

Research question 1: What is the level of knowledge on occupational hazards among welders in Rivers State based on age?

Table.1: Age and knowledge of occupational hazards among welders in Rivers State

Age (n=810)	Knowledge of hazard		Total
	High	Low	n(%)
	n(%)	n(%)	
<18 years	50(100)	0(0.00)	50(100)
18-27 years	255(100)	0(0.00)	255(100)
28-37 years	205(82.3)	44(17.7)	249(100)
>37 years	256(100)	0(0.00)	256(100)
Total	766(94.6)	44(5.4)	810(100)

Criterion= percentage level

Table 4.1 revealed the level of knowledge on occupational hazards among welders in Rivers State based on age. The result indicated that, all the respondents (100%) those aged <18 years, 18-27 years and >37 years had a high level of knowledge about occupational hazards. Thus knowledge of occupational hazards was found more among younger welders, than older ones.

Research question 2: What is the level of knowledge on occupational hazards among welders in Rivers State based on years of work experience?

Table 2: Years of work experience and knowledge of occupational hazards among welders in Rivers State

Years of work experience(n=810)	Knowledge of hazard		Total
	High	Low	n(%)
	n(%)	n(%)	
< 5 years	153(100)	0(0.00)	153(100)
5-10 years	311(87.6)	44(12.4)	355(100)
11-15 years	233(100)	0(0.00)	233(100)
>15 years	69(100)	0(0.00)	69(100)
Total	766(94.6)	44(5.4)	810(100)

Criterion = percentage level

Table 4.2 revealed the level of knowledge of occupational hazards among welders in Rivers State based on years of work experience. The result indicated that all (100%) those who had worked for < 5 years, 11-15 years, and >15 years had high knowledge about occupational hazards. Thus, knowledge of occupational hazards was found to be greater among welders who have worked for more years.

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Research question 3: What is the level of knowledge on occupational hazards among welders in Rivers State based on educational status?

Table 3: Educational status and knowledge of occupational hazards among welders in Rivers State

Educational status(n=810)	Knowledge of hazard		Total
	High	Low	n(%)
	n(%)	n(%)	
No formal education	2(100)	0(0.00)	2(100)
Primary	109(100)	0(0.00)	355(100)
Tertiary	655(93.7)	44(6.3)	699(100)
Total	766(94.6)	44(5.4)	810(100)

Criterion=percentage level

Table 4.3 revealed the level of knowledge of occupational hazards among welders in Rivers State based on years of work experience. The result indicated that all (100%) those who had no formal education, and primary education had high knowledge about occupational hazards. The majority of the respondents who had tertiary education also had high knowledge (93.7%). Thus knowledge of occupation hazards was found more among welders who were educated.

Test of hypotheses

Hypothesis 1: There is no significant relationship between age and knowledge of occupational hazards among welders in Rivers State

Table 4: Chi-square test showing the relationship between age and knowledge of occupational hazards among welders in Rivers State

Age	Knowledge of hazards		Total	df	χ^2-value	p-value	Decision
	Good	Poor					
	F(%)	F(%)					
<18 years	50(100)	0(0.00)	50(100)	3	104.83	0.00*	Ho rejected
18-27 years	255(100)	0(0.00)	255(100)				
28-37 years	205(82.3)	44(17.7)	249(100)				
>37 years	256(100)	0(0.00)	256(100)				
Total	766(94.6)	44(5.4)	810(100)				

***Significant; p<0.05**

Table 4 showed the Chi-square test of the significant relationship between age and knowledge of occupational hazards. The result showed that there was a significant relationship between the two variables (χ^2-value = 104.83, df = 3, p<0.05). Thus, the null hypothesis which stated that there was no significant relationship between age and knowledge of occupational hazards among welders in Rivers State was rejected.

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Hypothesis 2: There is no significant relationship between years of work experience and knowledge of occupational hazards among welders in Rivers State

Table 5: Chi-square test showing the relationship between years of work experience and knowledge of occupational hazards among welders in Rivers State

Years of work experience	Knowledge of hazards		Total	df	χ^2-value	p-value	Decision
	Good	Poor					
	F(%)	F(%)					
<5 years	153(100)	0(0.00)	153(100)	3	59.63	0.00*	H_o rejected
5-10 years	311(87.6)	44(12.4)	355(100)				
11-15 years	233(100)	0(0.00)	233(100)				
>15 years	69(100)	0(0.00)	69(100)				
Total	766(94.6)	44(5.4)	810(100)				

***Significant; p<0.05**

Table 5 showed the chi-square test of the significant relationship between years of work experience and knowledge of occupational hazards. The result showed that there was a significant relationship between the two variables (χ^2-value = 59.63, df = 3, p<0.05). Thus, the null hypothesis which stated that there was no significant relationship between years of work experience and knowledge of occupational hazards among welders in Rivers State was rejected.

Hypothesis 3: There is no significant relationship between the level of education and knowledge of occupational hazards among welders in Rivers State.

Table 6: Chi-square test showing a significant relationship between the **level of education and knowledge of occupational hazards among welders in Rivers State**

Level of education	Knowledge of hazards		Total	df	χ^2-value	p-value	Decision
	Good	Poor					
	F(%)	F(%)					
No education	2(100)	0(0.00)	2(100)	2	7.39	0.025	H_o rejected
Primary	109(100)	0(0.00)	109(100)				
Tertiary	655(93.7)	44(6.3)	699(100)				
Total	766(94.6)	44(5.4)	810(100)				

***Significant; p<0.05**

Table 6 showed the chi-square test of the significant relationship between the level of education and knowledge of occupational hazards. The result showed that there was a significant relationship between the two variables (χ^2-value = 7.39, df = 2, p<0.05). Thus, the null hypothesis which stated that there was no significant relationship between the level of education and knowledge of occupational hazards among welders in Rivers State was rejected.

Discussion

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Level of knowledge of occupational hazards among the welders based on age

The result of Chi-square test of significant relationship between age and knowledge of occupational hazards indicated that there was a significant relationship between the two variables (χ^2-value = 104.83, df = 3, p<0.05). Thus, the null hypothesis which stated that there was no significant relationship between age and knowledge of occupational hazards among welders in Rivers State was rejected in all categories of age group except for the age group of 28-37 years. All the respondents (100%), those aged <18 years, 18-27 years and > 37 years had high knowledge about occupational hazards, the decisions are based on the percentage levels. As a result, knowledge of occupational hazards was found more among younger welders than older ones. The findings of this study suggest that age is not a true determinant of occupational hazard awareness. Although, this perception differs with somebody's life pattern, is the person an introvert or an extrovert which may correspond with the live interactions? The findings of this study corroborate with the findings of Tadesse et al. (2016) whose study on occupational hazards and associated factors among welders showed that there was a significant difference in occupational hazards awareness based on age. Furthermore, this study's findings support Tagurum et al. (2018) who found that there was no significant relationship between age group and occupational hazards awareness among welders at p<6.05. The findings of this study are in line with the findings of Lavanya and Priya (2018) on knowledge regarding occupational hazards and safety measures among automobile workers who revealed that there was a statistically significant difference between occupational hazards awareness levels among the workers and the age group. The higher the age group was the higher the awareness of the occupational hazards they exhibited. The findings also support those of Chukwu et al. (2019) who discovered that there was a statistically significant difference between the age of the welders and their awareness of hazards (χ^2 – 131.905, p-value = (2.001). Odhiambo et al. (2020) confirmed this study as they showed that there was a significant difference between the number of years of a welder and the knowledge of hazards in their workplace, (p = 0.05). On the contrary, Kumar et al. (2013). Posited that age group was significantly associated in a univariate analysis. Also, the findings of Wokocha (2020) differ from the present study when they reported that there was a significant positive relationship between occupational hazards awareness and age.

Level of knowledge about occupational hazards of welders based on years of work experience

The result of the Chi-square test of a significant relationship between years of work experience and knowledge of occupational hazards revealed that there was a significant relationship between the two variables (χ^2-value = 59.63, df = 3, p<0.05). Thus, the null hypothesis which stated that there was no significant relationship between years of work experience and knowledge of occupational hazards among welders in Rivers State was rejected. Those welders who had worked for 5 years, 11-15 years and > 15 years (100%) had higher knowledge about occupational hazards than those who had 11-15 years of work experience. Thus, knowledge of occupational hazards was found more among welders who had worked for more years, the decision is based on their percentage levels. This finding implies that the greater the years of work experience, the greater the improvement in awareness of hazards in workplaces. The findings relate to the theory of positivism in social medicine which was interpreted by Alderson (1998) to mean that in relationships between cause and effect, intrinsic variables in the worker or welder are considered in the analysis before solutions are made. Hence the welders' awareness of hazards may increase in course of hazards impacts encountered through their years at work. The findings of this study support the findings of Eze et al. (2015) who showed that there was a significant difference between the work experience of welders and their occupational hazards awareness at (p<0.05). The same support goes to the findings of Lavanya and Priya (2018) who reported that there was a statistically significant difference between work experience and occupational hazards awareness among welders. The same support goes to Odhiambo et al. (2020) and Osagiede et al. (2010) at p=0.588. However, there was a significant statistical association between welders' work experience and occupational hazards awareness in the findings of Chukwu et al. (2019) and Gebrezgiabher et al. (2019) at (χ2=145.366, p-value=0.001) and (AOR, 044) respectively.

Level of knowledge of occupational hazards among the welders based on level of education

The result of the Chi-square test of a significant relationship between the level of education and knowledge of occupational hazards showed that there was a significant relationship between the two variables (χ^2-value = 7.39, df = 2, p<0.05). Thus, the null hypothesis, which stated that there was no significant relationship between the level of education and knowledge of occupational hazards among welders in Rivers State, was rejected. The findings exhibited that level of education has some positive impact to make in creating awareness of a welder. The higher the education level, the greater the awareness level. Little wonder why Nwafor et al. (2019) declared that the first step in protecting the workers is through education and training which involves the provision of information about

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the hazards of this occupation and then controlling the hazards through an engineering approach. They suggested that workers in Rivers State should be given proper education and training on workplace hazards. These findings complement the findings of Tagurum et al. (2018) which showed that there was a significant difference between awareness of hazards among the welders based on level of education. Lavanya and Priya (2018) are also supported by the findings of this study as they showed that there was a statistically significant difference found between occupational hazards awareness and level of education. Their findings are also congruent with the findings of Osagiede et al. (2020). Their findings differ from the findings of Kumar et al. (2013) which revealed that there was a significant association between awareness of occupational hazards and level of education among the welders in a univariate analysis. The findings of this study also disagree with the findings of Budhathoki et al. (2014) which showcased that there was a positive association between the level of education and awareness of occupational hazards among welders in Eastern Nepal. The findings of his study also contradict the findings of Tadesse et al. (2016) and Chuku et al. (2019) which showed significant harmony between occupational hazards awareness of welders based on their education levels.

Conclusion

Based on the results of this study, it was concluded as an overview that knowledge of occupational hazards among the welders in Rivers State was high in all the categories of socio-demographic determinants. Although knowledge of occupational hazards among them increased chronologically based on the increase in the level of work experience. Overall, the result showed that there was a significant relationship between knowledge of occupational hazards and age, work experience and level of education among the welders.

Recommendations

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

1. Generally, healthcare workers and educators should intensify campaign programmes in the urban, city and rural areas on workers' health and safety practices.
2. Government and concerned agencies should visit these welders and share informative fliers and pamphlets on safety rules and policies to follow at work, with decoding of the implications of exposure to hazards.
3. Part of healthcare delivery provisions in the budget of the state should include the purchase and free distribution of basic safety wears to this group of most dangerous professionals called welders in Rivers State.
4. Radio and Television Workers' Associations should promote regular special English and Native language programmes on safety practices and hazard awareness.

References

Alderson, P. (1998). Theories in healthcare and research: the importance of theories in health care. *British Medical Journal 317*. 1007-1010, ww.bmj.com retrieved on 28/10/2020.

Balthazar, M.A.P., Andrade, M., Ferreira de Souza, D., & Braga, A. L.D.S. (2018). Occupational Risks, working conditions and health of welders. *Journal of Nursing.* https://doi:org/10.5205/1981-8963-v12i4a230640p997-008-2018.

Bhumika, T.V., Thakur, M., Jaswal. R., Pundir, P., and Rajwar, E. (2014). Occupational injuries and safety measures adopted by welding workers: a cross-sectional study in south India. *Global Journal of Medicine and Public Health. 3* (5) 1-6.

Budhathoki, S.S., Singh, S.B. Sagtani, A.R., Niraula, R.S & Pokharel, K.P. (2014). Awareness of occupational hazards and use of safety measures among welders: a cross-sectional study from Eastern Nepal. *British Medical Journal 6* (4) 1-12 https://bmjopen.bmj.com/content/4/6/e004646., http://group.bmj.com/group/rights-licensing/permission. Accessed on 1/11/2019.

Chauhan, A., Anand, T., Kishore, J., Danielsen, E.T. and Ingle, K.G. (2014). Occupational hazards, exposure and general health profile of welders in rural Delhi. *Indian Journal of Occupational and environmental medicine 18*(1) 21-26. Doi:10.4103/0019-5278.134953.

Chuku, R.O., Okereke, C.C.A. Iwuoha, G., Anodie, C.C., Chikwe, C.M. & Nwoke, E.A. (2019). Occupaitonal hazardss and use of personal protective equipment among small scale welders in Owerri North L.G.A., Imo State, Nigeria. *IOSR Journal of Nursing and Health Science* 8(b)ser.vii.22-30 wwww.iosrjournals.org

Eze, I.B., Okoye, O. & Aguwa, E.N. (2015). Awareness and utilization of welders' personal protective eye devices and associated factors: findings and lessons from a Nigerian population. *Workplace Health and Safety*. 1-16, https://doi.org/10.1177/2165079915578665. https://journals.sagepub.com/doi/full/10.117/2165079915578665. Accessed on 31/10/2019.

Government Craft Development Centre, Port Harcourt (2018). Welders Register

International Labour Organisation (2012). International standard classification of occupations (ISCO) structure, group definitions and correspondence tables 2012. ILO. Geneva. Available from:https://www.ilo.org/wcmsp5/groupspublicofdgreports/gdcoom/gpubli/documents/publication/wcms172572pdf. Retrieved 5/9/2019.

Jain, R.K. & Rao, S.S. (2015). *Industrial safety, health and environment management systems*, (4th Ed). New Delhi-110002.

Kumar, S. G., Dharanipriya, A. & Kar, S.S. (2013). Awareness of occupational injuries and utilization of safety measures among welders in coastal south India. *The international Journal of Occupational and Environmental Medicine. 4*(4)172-177.www.theijoem.com

Lavanya, A.S. & Janaki, P.S. (2018). A study to assess the knowledge regarding occupational hazards and safety measures among automobile workers at selected workshops in Chengalpet. *International Journal of Science and Research*. Research gate impact factor (2018): 028/5.31F (2018): 7.426

Nwafor, A.U, Irondi, C.O & Okenna, A.O. (2019). Occupational hazards and safety practices among welders in Port Harcourt metropolis, Nigeria. *Intentional Journal of Innovative Research and Development (IJIR&D). 8* (10)119-124. www.ijird.com

Odhiambo, O.N., Peterson, W. & Isaac, M. (2020). Knowledge about physical hazards and use of personal protective equipment based on demographic characteristics and among small-scale welders in Nairobi City, Kenya. *Journal of Scientific Research and Reports. 26*(6) 120-130. Google Scholar https://doi:10.9734/jsrr/2020/v261530277

Onumbu, I.C. (2022). *Knowledge of occupational hazards and safety practices among welders in Rivers State*. An unpublished Ph.D Thesis, Ignatius Ajuru University of Education.

Osagiede, E.F., Ilokhor, O.K., Ehimen, F.A., Airefetalor, I.A., Otaigbe, O.I. & Abah, S.O. (2020). Assesment of awareness of occupational health problems and the practices of safety measures among welders in a semi-urban town in South-South Nigeria *West Journal of Medical and Biomedical Science.* 1 (2): 139 – 149. Doi:https://doi.org/10.46912/wjmbs.27

Sabitu, K., Iliyasu, Z. & Dauda, M.M. (2009). Awareness of occupational hazards and utilization of safety measures among welders in Kaduna metropolis, Northern Nigeria. *Annals of African medicine. 8*(1) 46-51.Retrieved on 17/8/2019.

Sadiq, L.S; Sabo, A; Ibrahim, K. & Abdulsamad, A. (2018). Health hazards of excessive light and utilization of safety measures among small scale welders in Nigeria. *Journal of Environment pollution and Human Health.* 6/1/26-40. Doi:10.1269jephh-6-1-4.http:///pubs.sciepub.com/ephh/6/1/4/index.html, Retrieved 31/10/2019.

Tadesse, S., Bazabih, K., Destaw, B. & Assefa, Y. (2016). Awareness of occupational hazards and associated factors among welders in Lideta Sub-city, Addis Abab, Etihopia. *Journal of Occupational Medicine and Toxicology: 11*(15). (https://creativecommons.org/licenses/by/40/) Doi:101186/512995-016-0105-x Accessed 11/112018. (Google Scholars)

Tagurum, Y.O., Gwonson, M.D., Yakubu, P.M., Igbita, J.A., Chingle, M.P. & Chirdan, O.O. (2018). Awareness of occupational hazards and utilization of PPE amongst welders in Jos metropolis, Nigeria: *International Journal of Research in Medical Sciences. 6*(7) 2227-2233. www.msjonline.org Doi:http://dx.doi.org/10.18203/2320-6012.ijrms20182808

Wokocha, V.U. (2020). *Knowledge of occupational hazards and use of personal protective equipment among welders in Ogba-Egbema-Ndoni Local Government Area of Rivers State.* An unpublished M.Sc Degree Thesis, Ignatius Ajuru University of Education.

World Health Organisation (2010). *Healthy workplaces: A model for action: for employers, workers, policymakers and practitioners*.WHO. Available: https://www.who.int/occupationalhealth/publications/healthyworkplacesmodelaction.pdf.