



Awareness and Compliance to Protective Eye Wear among Welders in Obio/Akpor LGA of Rivers State, Nigeria

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ABSTRACT

Personal protective equipment is essential for anyone involved in hazardous or injury prone job description such as construction, wood work, metal and rail engineering and as such workmen are mandated to protect themselves from harm. Many eye injuries can be prevented by wearing the appropriate protective eye wear. This study assessed the level of awareness and compliance to protective eye wear among welders in Obio/Akpor Local Government Area of Rivers State, Nigeria. A descriptive cross sectional study was conducted among welders in Obio/Akpor Local Government Area of Rivers State, Nigeria. Respondents were selected by simple random sampling. A structured interviewer administered questionnaire was utilized for data collection. Data was analyzed using simple descriptive statistics employing tables and charts. Test statistic for association of variables was done using the Chi Square test. The study involved 103 welders comprising of 101 males (98.1%) and 2 females (1.9%). The ages of the participants ranged from 16 -65 years with an average age of 34.92 ± 10.13 , with the 26-35 years group having the largest proportion of 40 participants (38.8%) and the 56-65 years group having the least with 4 (3.9%) participants. Majority, 98 (95.1%) of the participants were aware of the need for ocular protection during work out of which 65 (63.11%) complied regularly, 22 (21.3%) complied occasionally, 15 (14.56%) complied rarely and 1 (0.97%) had zero compliance. 50 (83.33%) participants with secondary school education complied regularly to protective eye wear use, 7 (63.64%) participants with tertiary education and 8 (25%) participants with primary education. Majority, 15 (77%) of participants with over 15years experience complied regularly while only 7 (33.33%) with 1-5 year experience complied regularly. The most preferred eye wear employed was Sunshade, 57(55.3%), followed by welding goggles, 43 (41.7%) while 3 (2.9%) used Fancy transparent glasses. Conclusively, Chi Square statistics revealed that compliance to protective eye wear was significantly associated with the age and educational attainment of participants but not associated with their years of work experience.

Keywords: Protective eye wear, welders. Ocular hazards.

INTRODUCTION

The eye is the most sensitive sense organ of the human body and it plays an important role in our daily life (Oriowo, 2009). According to Franck (2006), a seriously impaired eye either from injury or disease may not function well in terms of seeing but one can still make use of a leg or hand that has suffered from a serious injury or disease. The term awareness as used in this context is finding out if welders know about the benefits of protective eye wear, while compliance entails the frequency of usage during work. The personal and economic toll of eye injuries at work is alarming. According to the U.S bureau of labor statistics, more than 20,000 work place eye injuries happen each year and injuries on the job often require one or more missed work days for recovery (Dang, 2016). These injuries range from simple eye strain to severe trauma that can cause lifelong damage, visual loss and blindness. According to Singh *et al.*, (2014) Spectacle lenses are typically for vision correction while Safety glasses (goggles) provide eye protection against flying debris or against visible and near-visible light or radiation while Sunglasses allow better vision in bright daylight, and may protect one's eyes against damage from high levels of ultraviolet light but the type of protection needed will depend on the activity involved in. Personal protective equipment is essential for anyone working in hazardous



conditions such as building and road construction, metal work, rail/ bridge engineering, etcetera and as such employers are mandated to protect employees from harm. (Lydia *et al*, 2010). Welding requires additional eye and face protection and many eye injuries can be prevented by wearing the correct protective eyewear and not simply sunglasses or prescription spectacles because these are not designed to protect the eyes from splashes or impact. According to Lydia *et al*, (2010) welding without proper protection appropriate for the task can be a dangerous and unhealthy practice, but with the use of new technology and proper protection, the risks of injury and death associated with welding can be greatly reduced. Many common welding procedures involve open electric arc or flame, making the risk of burn and other hazards significant. To prevent these rays and flying metal objects from endangering the eyes, welders must wear personal protective equipment in form of heavy leather gloves and protective long sleeve jackets and safety goggles. Additionally, the brightness of the work area can lead to a condition called arc eye in which ultraviolet light causes an inflammation of the cornea and sometimes involves the retinas of the eye, which can be prevented by full face welding helmets with dark face plates to limit this exposure. (Shaikh, 2008). The predominance of ocular hazards in the metal fabrication industry and the witnessing of a hand full of welders working without any form of ocular protection necessitated this study to ascertaining the level of awareness and compliance to ocular protective device during work.

METHODS

This study was done in Obio/Akpor Local Government Area of Rivers State, Nigeria. Obio/Akpor L.G.A is one of the major LGA's that make up Port Harcourt City which is one of the major industrial and commercial hub in Nigeria and a major nerve center of the petroleum industry at the heart of the Niger Delta region. The L.G.A covers 260km² with an estimated population of 649,600 as at 2016 (National Bureau of Statistics, 2016). The area plays host to a large number of artisans with workshops scattered all over the LGA. These welders provide a wide range of services including the fabrication of Metallic gates, Doors, Burglary proofs, storage tanks and other metallic products. The study employed a cross sectional descriptive approach carried out between November 2017 and April 2018. The respondents were private (self-employed) practicing welders and apprentice in Obio/Akpor LGA of Rivers State. For small scale welding and fabrication workshops with four (4) welders or less, all the welders who accepted to be part of the study were included while for welding and fabrication workshops with more than four (4) welders, participants were randomly selected through balloting. The balloting process involved shuffling squeezed pieces of papers containing YES or NO options into a container and asking respondent who consented to pick from. All the subjects who picked YES option were co-opted for the study. A quantitative tool for data collection comprising of an interviewer administered structured questionnaire was used for the study. Questions in the questionnaire were used to assess knowledge and compliance to protective eyewear among welders. Data were analyzed and expressed as frequencies, proportion and tables. For the assessment of Knowledge/ awareness of the importance of protective eye wear during welding, a YES/NO response was used. Compliance level was rated as regularly, occasionally, rarely and never. Test statistics to determine association between compliance to protective eye and the age, years of work experience and educational



attainment among welders was done using Chi Square (χ^2). Approval for this study was obtained from the leadership of the Welders welfare association of the L.G.A. The purpose and procedure of the research was explained to the study participants and a verbal informed consent was obtained from them respectively. Health education on the importance of regular and correct use of protective eyewear during welding and related activities was carried out after every interview session with a welding practice. A possible limitation of this study was that the information obtained from the respondent may have been prone to self-reporting bias and attempts were made to overcome this by asking the questions repeatedly in different forms. Further research could be carried out at the city level using a combination of quantitative and qualitative data collection techniques to observe possible eye injury resulting from lack or improper use of protective eyewear among professional welders and welding apprentice.

RESULTS

A total of 103 participants were surveyed, out of which 101 (98.1%) were males and only 2 (1.9%) were females. The age distribution of the welders were; 19 (18.4%) participants between 16-25 years (including the 2 females), 40 (38.8%) participants between 26-35 years, 29 (28.2%) participants between 36-45 years, 11 (10.7%) participants between 46-55 years and 4 (3.9%) participants between 56-65 years with the female welders constituting only 1.94% (n=2) as shown figure 1 below. The mean age of all the participants was 34.92 ± 10.13 , while the mean age of the males was 35.17 ± 10.07 and that of the females was 22.50 ± 2.12 as shown in table 1. Majority, 98 (95.1%) of the participants were aware that ocular risks related to welding can be effectively prevented by the use of appropriate protective eye wear while, 5 (4.9%) were not aware as shown in table 2. A significant proportion, 65 (63.11%) of the participants employed protective eye wear regularly, 22 (21.36%) employ it occasionally, 15 (14.56%) uses it rarely and only 1 (0.97%) had never employed any form of protective eye wear during welding as shown in table 3. Considering age of participants and level of compliance, 75% (n=3) participants between age 56-65 years complied regularly, followed by 72.73% (n=8) participants between age 46-55 years, 68.97% (n=20) participants between age 36-45 years, 57.50% (n=23) between age 26-35 years and 57.9% (n=11) between age 16-25 complied regularly to protective eye wear during work as shown in table 4. Chi square analysis revealed that there was a statistically significant association between age and level of compliance to protective eye wear among welders. ($\chi^2_{\text{cal}} = 42.31$, $p \leq 0.05$, d.o.f = 12) as shown in table 5. Participants with more years of welding experience also complied more regularly as 71.43% (n=15) with over 15 year experience complied regularly, 74.2% (n=23) with 6-10 year experience also complied regularly and only 33.33% (n=7) participants with 1-5 year experience complied regularly as shown in table 5. However Chi square analysis revealed that there was no statistically significant association between years of work experience and level of compliance to protective eye wear among welders. ($\chi^2_{\text{cal}} = 12.256$, $p \leq 0.05$, d.o.f = 9) as shown in table 7. Considering the level of educational attainment 83.3% (n=50) participants with secondary school level of education complied regularly with the use of protective eye wear, while 63.64% (n=7) participants with tertiary education did and only 25% (n=8) participants with primary school level of education did comply regularly as shown in table 6. Chi square analysis revealed that there was a statistically significant association between



level of educational attainment and compliance to protective eye wear among welders. ($\chi^2_{cal} = 43.188$, $P \leq 0.05$, d.o.f = 6) as shown in table 9. The most preferred type of protective eye wear employed by participants was Sun shades, 57(55.3%), followed by welding goggles 42(41.7%) and 3(2.9%) participants employed fancy transparent glasses and none employed corrective spectacles as shown in table 7.

Table 1: Gender distribution of the age of participants.

Gender	Mean age (years)	Frequency	Proportion (%)
Male	35.17	101	98.1
Female	22.50	2	1.9
Total	34.92	103	100

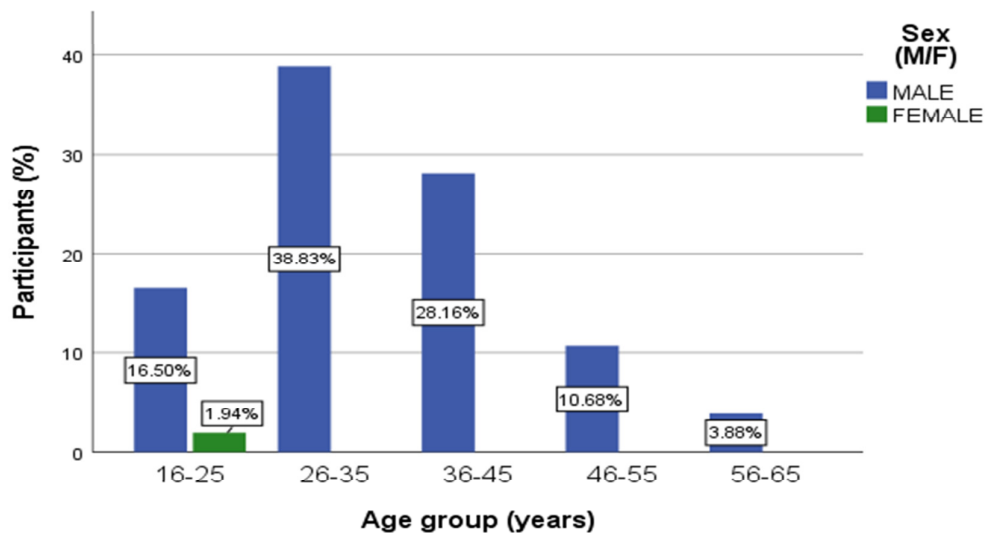


Figure 1: Age distribution of participants

Table 2: Level of awareness of the importance of protective eye wear

Awareness	Frequency	Proportion (%)
Yes	98	95.1
No	5	4.9
Total	103	100.0

Table 3: Level of compliance to regular use of protective eye wear

Level of compliance	Frequency	Proportion (%)
Regularly	65	63.11
Occasionally	22	21.36
Rarely	15	14.56
Never	01	0.97
Total	103	100.00



Table 4: Compliance level based on age of participants

Compliance level	16 – 25	26 – 35	36 – 45	46 – 55	56 – 65	Total
Regularly	11(57.90)	23(57.50)	20(68.97)	08(72.73)	3(75)	65
Occasionally	04(21.05)	10(25.00)	05(17.24)	02(18.18)	1(25)	22
Rarely	03(15.79)	07(17.50)	04(13.79)	01(9.09)	0(0.0)	15
Never	01(5.26)	0(0.00)	0(0.00)	0(0.00)	0(0.0)	01
Total	19(100)	40(100.)	29(100)	11(100)	4(100)	103

Table 5: Pearson Chi Square test of the level of compliance to protective eye wear based on age

Chi Square (X^2)	Degree of Freedom (dof)	N	Exact Significance (2 tailed)
42.31	12	103	0.000

Statistical significance is considered at a level of 0.05 ($p \leq 0.05$)

Table 5 above shows that compliance level to protective eye wear is significantly associated with the age of participants

Table 6: Compliance level based on years of experience

Compliance Level	1 – 5 years	6 – 10 years	11 –15 years	>15 years	Total
Regularly	7(33.33)	23(74.20)	20(66.67)	15(71.43)	65
Occasionally	8(38.10)	4(12.90)	6(20.00)	4(19.05)	22
Rarely	5(23.81)	4(12.90)	4(13.33)	2(9.52)	15
Never	1(4.76)	0(0.0)	0(0.00)	0(0.00)	1
Total	21(100)	31(100)	30(100)	21(100)	103

Table 7: Pearson Chi Square test of the level of compliance to protective eye wear based on level of experience.

Chi Square (X^2)	Degree of Freedom (df)	N	Exact Significance (2 tailed)
12.256	9	103	0.000

Statistical significance is considered at a level of 0.05 ($p \leq 0.05$)

Table 7 above shows that level of compliance to protective eye wear is not significantly associated with years of work experience among participants

Table 8: Compliance level based on educational attainment

Compliance level	Level of education			Total
	Primary	Secondary	Tertiary	
Regularly	8(25.00)	50(83.33)	7(63.64)	65
Occasionally	11(34.38)	7(11.67)	4(36.36)	22
Rarely	12(37.50)	3(5.00)	0(0.00)	15
Never	1(3.12)	0(0.00)	0(0.00)	01
Total	32(100)	60(100)	11(100)	103



Table 9: Chi Square test of the level of compliance to protective eye wear based on age

Chi Square (χ^2)	Degree of Freedom (df)	N	Exact Significance (2 tailed)
43.19	6	103	0.000

Statistical significance is considered at a level of 0.05 ($p \leq 0.05$)

Table 9 above shows that compliance level to protective eye wear is significantly associated with the level of educational attainment among participants

Table 10: Most employed type of protective eye wear

Most employed type of eye wear	Frequency	Percentage (%)
Sun shades	57	55.9
Fancy transparent glasses	3	2.9
Welding goggles	42	41.2
Corrective spectacles	0	0
Total	102	100

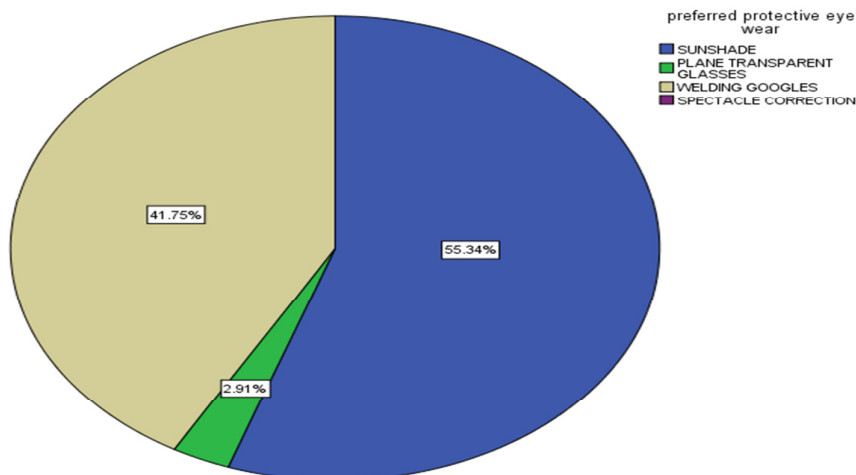


FIGURE 2: Pie chart showing the preferred type of protective eye wear employed by the participants.

DISCUSSIONS

The 26-35 years age group constituted 38.83% making them the largest group. This differ slightly from a similar study on the impact of welding on the vision of welders in France by Boissin *et al* (2002) in which the 36-45 years age group was the largest, constituting 40.2% of the participants. The female welders constitutes only 1.94% of the respondents which supports the notion that welding is a male dominated profession which is similar to finding from an earlier study by Davies *et al* (2007) conducted in Calabar, Nigeria where all the participants (welders) were males. It was observed that the female welders were within the youngest age group (16-25years) which indicates that young ladies are gradually venturing into this male dominated profession. Majority of the participants, 95.1% were aware of the fact that protective eye wear can prevent ocular hazards relating to welding



while 4.9% were not aware. This is similar to findings reported from a study on the awareness and utilization of protective eye devices among welders in a South Western Nigerian Community by Ajayi *et al* (2011) where 90.6% of the participants were aware of the benefits of protective eye wear. The level of awareness of the benefits of protective eye wear among welders in Obio/Akpor L.G.A. of Rivers state is relatively high though there is need for enlightenment in order to better the level of awareness among welders in the LGA and the entire Niger Delta region. From the study, 63.11% of the participants complied regularly to the use of some form of eye protection during welding, 21.36% complied occasionally, 14.56% rarely and 0.97% showed zero compliance to protective eye wear. The level of regular compliance among welders was above average but lower than compliance level reported from a study on the level of awareness and compliance with the use of safety protective devices and patterns of injury among Quarry workers in Sabon-Gari Local Government Area of Kaduna state North Western Nigeria by Sofiyan and Ogunleye (2012) where 71.6% of the participants used protective eye wear regularly. It was observed that only 0.97% of the participants reported never using any form of ocular protection during work and fell within the youngest age group with fewer years of work experience. This could be due to shorter periods of welding activities, inexperience or youthful tendencies. The compliance level based on age analysis revealed that older welders complied more regularly as 75% of participants between the ages of 56-65 years complied regularly followed by 72.73% of participants between ages 46-55 years, 68.97% between age group 36-45 years, 57.5% between age group 26-35 years, and 57.9% between age group 16-25 years. This is in accordance with the test statistics (Chi Square) which revealed that the level of compliance to protective eye wear among welders was significantly associated with age. The study revealed that participants with 6-10 year experience complied more regularly (74.2%), closely followed by those with over 15 year experience (71.43%), while those having 1-5 year experience complied least regularly (33.33%). Test statistics (Chi Square) revealed that the level of compliance to protective eye wear was not significantly associated with the years of work experience of the participants.

The study showed that all the participants had some form of formal education ranging from primary to tertiary. The compliance level based on educational attainment revealed that participants with a maximum of secondary school education complied more regularly at 83.33%, followed by participants with tertiary education, 63.64% while the primary school leavers complied less regularly at 25%. The higher compliance of the secondary school leavers could be due to the fact that majority of the older welders attained secondary education. Test statistics also established a statistically significant association between the level of compliance to protective eye wear and the level of educational attainment among welders. This bring to the fore the need to integrate safety education into all levels of formal and non-formal education and to inculcate it as an integral part of the welding training and practice as well as other related fields. This study also revealed the most employed type of protective device with 55.9%, utilized by the participants was Sunglasses, an inappropriate protective device for welding, followed by welding goggles, 41.2% which is the more appropriate protective eye wear, 2.9% employed fancy transparent glasses while none employed corrective spectacles. This shows that though welders



employed some form of eye protection during welding, the majority do not use the appropriate protective eye wear. This correlates with the study by Ganesh (2013) on the awareness of occupational hazard and utilization of safety measures among welders in Coastal South India where 67.5% of the participants utilized the wrong type of protective eye wear. The employment of the wrong type of ocular protection among welders in Obio/Akpor LGA is mainly due to availability and cost rather than choice.

CONCLUSION/RECOMMENDATION

The study revealed that the level of awareness among welders on the need for ocular protective device is relatively high compared to the level of regular compliance. There is a statistically significant association between welder's age and level of educational attainment and compliance to ocular protection during work. The level of regular compliance to protective eye wear was higher among older welders and lower among welders in the younger age brackets. Though welders with more years of work experience reported greater compliance to protective eye wear, there was no statistically significant association between work experience as a welder and compliance to protective eye wear. It was also observed that the level of educational attainment among welders did not directly influence their employment of protective eye wear during welding as welders with secondary level education complied more regularly, though in general there exist a statistically significant relationship between the level of educational attainment and compliance to protective eye wear during work. All but one welder employed some form of ocular protection; however majority employed the wrong type of protective eye wear mainly due to affordability and availability. There is need for general and ocular safety education periodically among professional welders and apprentice on the benefits of protective eye wear as well as some form of enforcement by the older welders on the younger ones to comply regularly to protective eye wear during welding and related activities. Also government, non-governmental organizations, religious bodies, faith based organization and well-meaning individuals should donate or subsidize the cost of the recommended protective eye wears to make them affordable and readily available. Conclusively, as part of the requirements for enrolment into any welding training, all prospective trainees should be asked to provide for themselves the appropriate safety devices including welding goggles while all graduating trainees should be provided with same protective gears among other equipment upon graduation by family, friends and well-wishers.

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Conflict of interest

The researchers hereby declare that there is no conflict of interest in the study and its reported finding

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