Pattern ofEye Diseases amongWelders in Parts ofSouth Eastern Nigeria.

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Abstract: *The eye remains the delicate organ in the body. A number of things can go wrong in any of the structures of the eye, causing visual impairment and blindness when fully not protected during welding activities. This study aimed at assessing the Pattern of eye diseases among welders in Ahiazu Mbaise, Imo state Nigeria. Structured, pretested questionnaires elicited in Igbo language was used to collect data from 400 consenting welders. Eye screening and examination were used to validate questionnaire findings. It was found that age, marital status and education levels showed a moderate association with the awareness of prevalence of eye diseases but with strong association with the types of eye diseases as the correlation coefficients are 0.898, 0.893, 0.930 and 0.865 respectively. However age shows association with the use of protective gears, using pearson chi-square $(X^2)=196.74$; df=4; p-v = 0.001. It was equally found that there was a significant relationships between age, marital status and level of education and effects of welding smoke on health with $(X^2) = 436.710$, df =8; p-v=0.001, $(X^2) = 373.939$; df = 6; p-v = 0.001 and $(X^2) = 406.309$; df =8; p-v = 0.001. It is concluded that exposure to the radiations emitted during welding at the welder's work environment withoutappropriate protection gear mainly produce the ocular conditions, including pterygium,photokeratitis and cataractwith their major symptoms, such as burning sensations, photophobia and eye pain.These findings therefore have provided possible guidelines for proper education, awareness and screening of welders to avoid eye diseases.*

Keywords: Diseases, Exposures, Eye, Pattern, Welders and Work

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I. Background

Welding is a process of joining two metal parts together by applying intense heat between them, which causes the parts to intermix after melting. Welding processes are widely used for the manufacture of shipyards, civil engineering structures, mining industry transportation means, petrochemical industry, and metallurgy(Azian, 2012). The intense heat of the arc or flame vaporizes the base metal and/or electrode coating. This vaporized metal condenses into minute particles called fumes that can be inhaled or irritate the eyes (Azian, 2012). All welding processes generate fumes, but most fumes are produced during electric arc welding. The thermal effects can cause agglomeration of the particles into particle chains and clusters that can be deposited in the human respiratory tract or even entered the eyes (Ashby, 2002, Fiore, 2006 & Ravert, 2006). Most of the fume particles are less than 1micron in diameter when produced, but they tend to grow in size with time due to agglomeration (Mansouri, 2008).

Vimesh-Jani & Mazumumda (2004) and Kayode *et al;* (2013) argue that the commonest welding technologies used in the world is the small scale industries are electric arc welding and oxy-fuel gas welding. In Electric-arc welding, electric arc is struck between the metallic electrodes and work piece. Tiny globules of molten metal are transferred from the metal electrode to the weld joint. A holder or clamping device with an insulated handle is used to conduct the welding current to the electrode. A return circuit to the power source is

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made by means of a clamp to the work piece (Nicholas *et al;* 2010). Electric-arc welding is mainly practiced on a small scale in Nigeria and this means that in many instances production occurs in residential areas where there can be serious health hazards not only to the Electric-arc Welders but also other occupants or family members.

Welding smoke is a mixture of very fine particles (fumes) and gases. Welding fumes and gases comes from base materials been welded or filler material that is used, coating and paints on the metals being welded or coat covering the electrode, shielding gases supplied from cylinder, chemical reaction resulting from the action of ultraviolet light from the arc or heat, process and consumables used and contaminants in the air. Route of exposure to welding smoke is mainly through inhalation or eye contact. The amount and type of metals and gases found in welding smoke will depend on the welding process and base metal used (Zimmer & Biswas, 2001). Types of metals commonly found in the welding fumes include Aluminium, Beryllium, Cadmium oxides, Chromium, Copper, fluorides, Iron-oxide, Lead, Manganese, Molybdenum, Nickel, Vanadium, Zinc-oxide (Coggen*et al;* 1994; OSHA, 1995; Rugger, 1995; Contras &Chan-Young, 1997). Welding process produce gases which contain Carbon-monoxide, Fluorine, Hydrogen-fluoride, and Nitrogen-oxide (Brandshaw*et al;* 1998).

Pang *et al;* (2007) and Sithole*et al;* (2009) also maintains that welding is an important tool for maintenance and construction in industry but, it is also a source of artificial ultraviolet radiation (UVR). There are several types of welding which include forge, arc, gas, aluminothermic, ultrasonic and electron beam welding. However, there are two major types namely, Shielded Metal Arc (SMA) and gas (oxyacetylene) welding (Howden*et al;* 2009). SMA is the most common type of welding used in industry (Pang *et al;* 2007). Welding emits high levels of UVR, metal fumes and gases4 and exposure to these adverse effects could potentially cause injury to workers (Pang *et al;* 2007 and Sithole*et al;* 2009). The spectral emission of welding arcs peaks in the ultraviolet and blue light region of the spectrum and for this reason, the amount of energy in this region is potentially more hazardous to the eyes (Sliney, 2006); therefore welders must protect themselves against these radiations.

In Africa, the main actinic component of welding is UVB which is produced mainly by arc welding and to a lesser extent by gas welding (Sliny, 2006). Exposure to UVB has been considered to be associated with many ocular conditions such as cataract (Hayashi *et al;* 2003 and Mody*et al;* 2006) which is the major cause of blindness in most parts of the world8 including South Africa (Bergmanson, 1995). Acute exposure to UVB results in acute kerato-conjunctivitis, a condition also known by various names such as welding flash, flash eye, photophthalmia, arc eye or actinic ray photokeratitis (Tomany*et al;* 2004). Exposure to UVR has also been considered to increase the risk of age-related macular degeneration (Doughty &Oblak, 2005).

Disease pattern is in a state of constant flux, over a period of time. A community based study can be more precise in representing the true picture of the disease pattern in the population rather than a hospital based study. The selection bias associated with the latter one is more common and not a true sample representative of the community (Rizyal, 2010). The causes of blindness and the pattern of eye diseases differ among welders and the people who have outlet close them and often in arc welders. A study of the pattern of eye diseases is very important because while some eye conditions are just causes of ocular morbidity others invariably lead to blindness. Thus, there are other ocular and systemic problems associated with welding, and these include foreign objects entering the eye, fume entering the eyes, electric shock and injuries resulting from explosion (Howden *et al*; 1998). Hazardous gases such as carbon dioxide, carbon monoxide, nitrogen oxide and ozone are associated with the welding process and when welding takes place in a poorly ventilated or confined space, these gases are more likely to cause eye irritation also. (Sithole *et al;* 2009).

The diseases and hazards associated with the welding process depend on the type of welding, the materials (base metals, surface coatings, electrodes) to be welded, and the environmental conditions (outside or in a confined space, for instance) (Sithole *et al;* 2009). Aside from the skin, the eye is the organ that is the most susceptible to damage induced by ultraviolet radiation (UVR). While eyebrows, eyelashes and pupillary constriction create some defense against extreme light, the eye is still susceptible to damage. The main UVR source is the sun, but UVR can also be produced artificially by tools such as sunlamps and welding arcs (Mercede *et al;* 2014).It is vital that appropriate eye protection be used for all welding operations to protect the eyes from bright light, heat, ultraviolet light, and flying sparks. Welders generally shield themselves from harmful radiation and mechanical injuries by using protective devices such as safety goggles, helmets and face shields (Goff, 2006 and Sithole *et al;* 2009). However, some radiation may enter the welding helmet from behind and be reflected into the welder's eyes by the filter glass and other parts of the inside of the helmet (Sithole *et al;* 2009).

Considering the potential influence of these factors on effects of non-compliance and acceptance of protective devices by the welders and subsequent resultant to eye disease, this studyinestigatedthe patterns of eye diseases among welders in AhiazuMbaise, South Eastern Nigeria.

II. Methods

Study area

This study was carried out in AhiazuMbaise Local Government Area (LGA) of Imo State, South Eastern Nigeria. The area constitutes approximately a major city of Imo State, Nigeria. It has a total population of about 170,902 people as of 2006 census and covers an area of 114 square kilometers (km^2). It is located in the tropical rain forest with climatic and environmental conditions that support farming. The major language in the area is Igbo Language. Many also speak English and "Pidgin English". The people are predominately farmers, artisans, traders and civil servant. The peopleare most densely populated area in West Africa as they are homogenous group of more than 1000 persons per square kilometer is the most

Study design and Sampling

The study employed a cross sectional descriptive design with the study population comprising of welders resident within AhiazuMbaise LGA Nigeria. A pretested questionnaire was used to assess the patterns of eye diseases among welders. The questionnaire was validated using face and content validation. Thirty five questionnaires were pretested in another community in AhiazuMbaise with similar characteristics but not included for the actual study. The questionnaire was tested for reliability using Cronbach Alpha test (Cronbach, 1951) and a reliability coefficient of 0.70 was obtained.

AhiazuMbaise has fourteen (14) communities grouped under electoral divisions. A multi-stage technique was used in sampling of welder's workshop for the study from the divisions. At the first stage, one community was randomly selected from each division through balloting. Systematic random sampling was then used in the selection of 400 welder's workshops from which the study participants were drawn. Sampling started from communityCentre of each community and workshops were selected at intervals of two workshops. This process went round the community until the required sample size for each selected community was reached. Additionally, at occasion non-workshop eligibility, the next workshop was selected. The next stage was the selection of eligibility participants were those who were resident in the area for the past 1 year, above 18 years of age and may either be the boss or apprentice.

Prior to data collection, the members of the selected communities were gathered at each head of the welder's workshop for sensitization exercise concerning the survey to be performed at their workshops and the need for their support. The appointment to that effect was scheduled in agreement with the welders and community leaders who also helped to mobilize the members of their respective communities.

Data Collection

Data collection processes lasted for 3 months. Data was collected by administering structured pretested questionnaires to the study participants by members of the study group. For the selected participants, the study was once more introduced and informed consent was sought for their participation in the study. For those who gave their consent, the questionnaire was then elicited in the local (Igbo) language.

Data Analysis

The method of data analysis was descriptive, Data collected were presented in tables of frequency distribution and were all expressed as the percentage of the distribution. Chi square was used to test for associations between social demographic characteristics of welders and prevalence of different types of eye disease at 5% significant level. Data analysis was performed on IBM-SPSS Statistics version 20.

III. Results

Socio-demographic characteristics

A total of 400 welders were involved in the study. The mean age and the standard deviation were 16.53+5.24 years. Fifty percent of the respondents were between 31 and 40 years old. The majority (100%) were male and a greater proposition (42%) were single. 44.8% of the respondents had Secondary education (Fig 1) while (44.3%) are the educational level of thespouses of the married respondents. They were predominantly Christians (78.8%). Their income structure was such that 42.2% earned between ₦18,000 and ₦27,000 and 11.5% earned above ₦57,000; with 1% earning between ₦28,000 and ₦37,000 per month (Table 1).

Prevalence of eye diseases associated with welders

Majority of the respondents (87.5%) were aware of eye diseases and only (10.5%) has suffered from the eye diseases. Majority of the respondents (54.8%) reported days/weeks as duration of eye problem and (28.6%) said the eye problem came with redness of the eye and (30.9%) reported eye pains. Out of 400 participants; (52.4%) don't go for eye treatment in manifestation of any eye problem, (28.6%) resulted in self treatment and only (19%) look for professional care. For those who seek professional care, only visit private

eye clinic with (66.7%). The source of information was presented in figure 2; highest percentage (37.5%) said relatives were their source of information on eye disease followed by friends (22.5%) and radio/TV (20%).

Table 1: Socio-Demographic Data of Welders

Variables	Frequency	Percentage
Age of the welders		
<20 years	60	15.0
21-30 years	80	20.0
31-40 years	200	50.0
41-50 years	40	10.0
51 yrs above	20	5.0
Total	400	100.0
Sex of the participants		
Male	400	100.0
Female	0	0.0
Total	400	100.0
Marital status		
Single	168	42.0
Married	158	39.5
Divorced/Separated	39	9.8
Widowed	35	8.8
Total	400	100.0
Level of education of spouse if married		
No formal education	10	6.3
Trade certificate	20	12.6
Primary education	70	44.3
Secondary education	50	31.6
Tertiary education	8	5.0
Total	158	100.0
Religion		
Christianity	315	78.8
Islam	0	0.0
African traditional	30	7.5
Others	55	13.8
Total	400	100.0
Income per month of the participant (₦)[Z]		
< ₦18,000	33	8.2
₦18,000-27,000	168	42.0
₦28,000-37,000	20	1.0
₦38,000-47,000	20	3.0
₦48,000-57,000	30	6.0
> ₦58,000	141	11.5
Total	400	100.0

One Naira (₦) is equivalent to 345 USD
[Z]The earning cut off were selected using Nigerian minimium wage of 18,000 naira. The intervals were then categorized based on the different earning categories at the local government level.
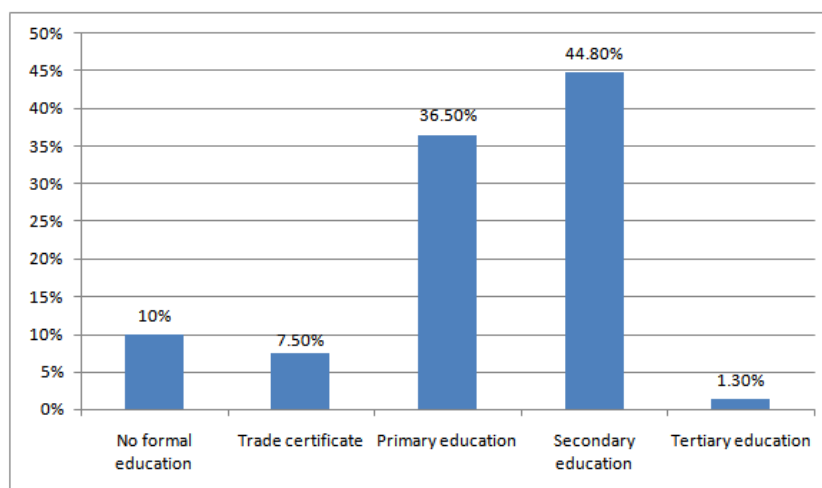

Figure 1: Educational level of the participants

Table 2: Prevalence of eye diseases associated with welders

Statement	Frequency	Percentage
Aware of eye diseases		
Yes	350	87.5
No	50	12.5
Total	400	100.0
Have suffered from eye disease before		
Yes	42	10.5
No	358	89.5
Total	400	100.0
If yes, duration of the eye problem		
Days/weeks	23	54.8
Months	14	33.3
Years	5	11.9
Total	42	100.0
Manifestations of eye problem (Symptoms)[z]		
Fever	1	23.8
Headache	5	11.9
Cold	0	0.0
Redness of the eye	12	28.6
Swelling of the eye	1	23.8
Eye pains	13	30.9
Eye itching	1	23.8
Total	42	100.0
Participant responds to injury from welding		
Self treatment	12	28.6
Professional care	8	19.0
No treatment	22	52.4
Total	42	100.0
Where do the welders get eye treatment?		
Herbal homes	4	9.5
Private eye clinic	28	66.7
Missionary/ NGO	0	0.0
Cottage hospital	4	9.5
Federal medical centre	2	4.7
Free medical outreach	1	2.3
Others	3	7.1
Total	42	100.0

[z] Based on multiple response
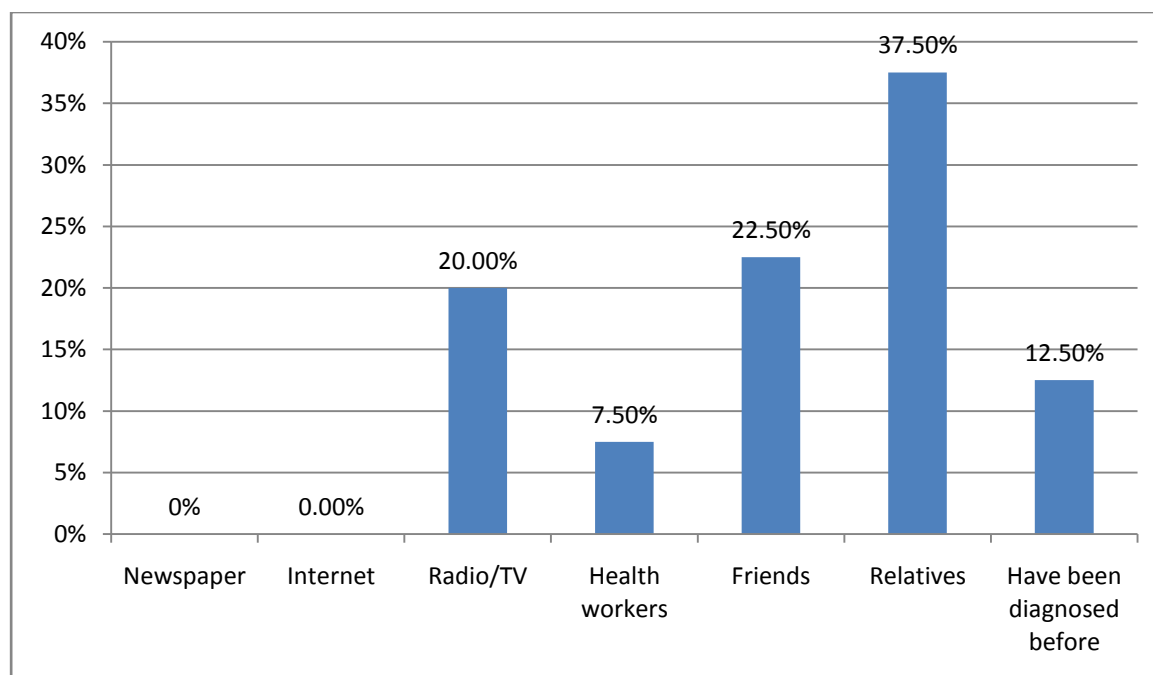
Figure 2: Source of information on eye diseases

Relationship between socio-demographic and prevalence of eye disease

Table 3 depicts the relationship between socio-demographic and prevalence of eye disease. Age and marital status of the participants showed moderate association with awareness of eye diseases with correlationcoefficient of 0.644 and 0.763 respectively. Also, age of the participants showed moderate association with eye disease patients with correlation coefficient of 0.579 and marital status showed weak association with eye diseases patients with correlation coefficient of 0.317. Income of the participants has association with welding eye related diseases; using Pearson Chi-Square $(x^2) = 309.360; df=5; p-v =0.001$(table 3c).

Table 3: Relationship between socio-demographic and prevalence of eye disease

3a: Age of the welder * Aware of eye diseases

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Age of the welder	2.7000	400	1.00625	.05031
	Aware of eye diseases	1.1275	400	.33395	.01670
Pair 2	Marital status	1.8575	400	.92701	.04635
	Aware of eye diseases	1.1275	400	.33395	.01670
Paired Samples Correlations					
		N	Correlation	Sig.	
Pair 1	Age of the welder & Aware of eye diseases	400	.644	.000	
Pair 2	Marital status & Aware of eye diseases	400	.763	.000	

Table 3b: Age of the welder * Have suffered from eye diseases

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Age of the welder	2.7000	400	1.00625	.05031
	Have suffered from eye diseases	1.8950	400	.30694	.01535
Pair 2	Marital status	1.8575	400	.92701	.04635
	Have suffered from eye diseases	1.8950	400	.30694	.01535
Paired Samples Correlations					
		N	Correlation	Sig.	
Pair 1	Age of the welder & Have suffered from eye diseases	400	.579	.000	
Pair 2	Marital status & Have suffered from eye diseases	400	.317	.000	

Table 3c: Income of welders per month * Have suffered from eye diseases

		Have suffered from eye diseases		Total
		Yes	No	
Income per month	< 18,000	33[a]	0[b]	33
	18,000-27,000	9[a]	159[b]	168
	28,000-37,000	0[a]	20[a]	20
	38,000-47,000	0[a]	20[a]	20
	48,000-57,000	0[a]	30[a]	30
	> 58,000	0[a]	129[b]	129
Total		42	358	400

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)	
				Sig.	95% Confidence Interval
					Lower Bound
Pearson Chi-Square	309.360[a]	5	.000	.000[b]	.000
Likelihood Ratio	198.555	5	.000	.000[b]	.000
Fisher's Exact Test	182.838			.000[b]	.000
Linear-by-Linear Association	71.667[c]	1	.000	.000[b]	.000
N of Valid Cases	400				

Personal eye screening among welders
Visual Acuity (VA) among Welders

Among the welders that were screened, 185(46.3%) had 6/6 visual acuity, 6/9 was 107(26.7%) and 6/12 was108 (27%) (Table 4).

Prevalence of occluder

In occluder screening, majority of the welders were found to have reduced vision with occlude 66(16.5%), clear vision with occlude 64(16%) and the least was no change in vision with occlude, no significant improvement in vision andCorrected vision respectively with 21(5.2%) (table 5).

Pentorch Eye Examination

In pentorch eye screening, majority of the welders were found with no abnormality detected 83(20.8%), transparent elevated masson on the lateral and corneal scar on left cornea with 44(11%) and the least was slightly raised transparent masson on the lateral side of the right conjunctive with 37(9.3%) (table 6).

Table 4: Visual Acuity (VA) among Welders

V.A Category	Frequency	Percentage
6/6	185	46.3
6/9	107	26.7
6/12	108	27.0
Total	400	100.0

Normal visual acuity

Table 5: Prevalence of occluder

Statement	Frequency	Percentage
Did not improve vision	23	5.8
Improvement vision	32	8.0
Blurred vision with occlude	60	15.0
Reduced vision with occlude	66	16.5
Clear vision with occlude	64	16.0
Brighter vision with occlude	43	10.7
No change in vision with occlude	21	5.2
No significant improvement in vision	21	5.2
Better vision with occlude	26	6.5
No cooperative	23	5.8
Vision corrected	21	5.2
Total	400	100.0

Table 6: Pentorch Eye Examination

Statement	Frequency	Percentage
Slightly raised transparent masson on the lateral side of the right conjunctive	37	9.3
No abnormality detected	83	20.8
Transparent elevated masson on the lateral	44	11.0
Injected conjunctive	38	9.5
Corneal scar on left cornea	44	11.0
Pinguelum on temporal aspect of the right eye	38	9.5
Red conjunctiva	38	9.5
No inflamed pinguelum on the nasal aspect of the right eye	38	9.5
Brown conjunctiva	40	10.0
Total	400	100

Ophthalmoscopic Eye Examination

In Ophthalmoscopic eye examination, majority of the welders were found to have suspicious disc with 100(25.0%) compared to NAD, dark patches scattered on suspicious disc, nasal shift of vessels and scattered dark partches on the fudus respectively with 60(15%) (Table 7)

Trignometry Eye Examination

Trignometry range in eye examination, grater range was 25.0-30.5 with 112(28%) and the least was 19.0-24.5 with 87(21.8%) (Table 8).

Staining Method Eye Examination

In staining method eye examination, majority of the welders had no stain seen on the cornea with 130(32.5%), no stain with florensic strips and Slight staining observed recorded d same 70(17.5%); Stain observed on the left cornea was 75(18.8%) (Table 9).

Welders' Eye General Diagnosis

In general diagnosis on welders; majority of them were found to have Pinguenlum with 50(12.5%) followed by bilateral cataract and preshyopia, macuhapaity and refractive error with 40(10%) respectively. The least was 10(2.5%) for those with Primary open angle glaucoma (POAG) (Table 10).

Table 7: Ophthalmoscopic Eye Examination

Statement	Frequency	Percentage
Suspicious disc	100	25.0
NAD	60	15.0
Dark patches scattered on suspicious disc	60	15.0
Early lens opacity	40	10.0

Hot cooperative	20	5.0
Nasal shift of vessels	60	15.0
Scattered dark partches on the fudus	60	15.0
Total	400	100.0

Table 8: Trignometry Eye Examination

Trignometry range	Frequency	Percentage
19.0-24.5	87	21.8
25.0-30.5	112	28.0
31.0-35.5	101	25.2
36.0-40.5	100	25.0
Total	400	100.0

Table 9: Staining Method Eye Examination

Statement	Frequency	Percentage
No stain seen on the cornea	130	32.5
No stain with florensic strips	70	17.5
Did not cooperate	65	16.2
Slight staining observed	70	17.5
Stain observed on the left cornea	75	18.8
Total	400	100.0

Table 10: Welders' Eye General Diagnosis

Welders' Eye Diagnosis	Frequency	Percentage
Corneal ulcer	35	8.8
Primary open angle glaucoma (POAG)	10	2.5
Occular hypertension and preshyopia	12	3.0
Pinguenlum	50	12.5
Refractive error	40	10.0
Normal tension Glaucoma	35	8.8
Photo conjunctivitis and preshyopia	35	8.8
Bilateral cataract and preshyopia	40	10.0
Macuhapaity	40	10.0
Secondary Glaucoma	35	8.8
Nil	80	20.0
Total	400	100.0

IV. Discussion

This study carried out in Ahiazu Mbaise LGA of Imo State provides information on patterns of eye diseases among welders in Ahiazu Mbaise LGA, Imo State. And the findings are discussed below;

The result on the relationship between social demographic characteristic of Welders and prevalence of different types of eye diseasesshowed that the age and marital status of the participants are in moderate association with the awareness of eye diseases, which 350 (87.5%) participants agreed to be aware; with a correlation coefficient of 0.644 and 0.763 respectively. This is as a result of age maturity of the respondents. This is similar to the report from study done in Jos, North Central Nigeria on patients attending the eye clinic of the 347 Nigeria Air Force Hospital, Jos. (Olukorede &Oluyinka, 2012). This finding is contrast to what was obtained in a related study done in Orangi Town, Karachi that majority of welders were unaware that their job were hazardous to their eye (Uzma *et al;* 2006). Age of the participants showed moderate association also with eye disease of welders with correlation coefficient of 0.57a and marital status showed weak association with eye disease of the welders with correlation coefficient of 0.317. The reason for the weak association of marital status to prevalence of eye diseases is that both the old and young people are involved in welding activities without proper protection gear. This is in line with the similar research carried out in Owerri, Imo State (Ihekaire &Oji, 2017).

The strong association of Age, marital status, income and educational level withcorrelation coefficient of 0.898, 0.893, 0.930 and 0.865 respectively and the type of eye diseases of welders may be attributed to the fact that the majority of the respondents had centre educational attainment and had are in their early youthful age, which their income are much and alright for their living as majority of them are unmarried. This is similar to some studies; in Limpopo, South Africa (Sithole *et al;* 2009), Ilori, Kwara State Nigeria (Kayode *et al;* 2013), Jos, Plateau State, Nigeria (Olukorede and Oluyinka, 2012) and Owerri, Nigeria (Ihekaire &Oji, 2017) with a considerable associations, but in contrast to a research done in Orangi town, Karachi (Uzma *et al;* 2006).

In this study, the relationship between socio-demographic characteristic and attitude and knowledge of welders towards wearing protective gears shows that age, marital status, education level has a fair relationship with attitude with the attitude of welders towards wearing a protective gear. This may be attributed to the fact that most of the respondents attainted both secondary and primary schools and are able to read instructions and

are young men and are unmarried. This is in contrast with the similar research conducted in Ilorin part of Nigeria (Kayode *et al; 2013*) but agrees with the research conducted in Jos, Nigeria (Olukorede &Oluyinka, 2012) and Owerri, Nigeria (Ihekaire &Oji, 2017).

Many of the welders are in agreement through their responses to age, marital status, level of education and their income. This shows a clear association between socio demographic characteristics and the use of eye protective gears. This shows that the income of the welders has positive impact on their protection to dangers as they would prefer to prevent than cure as more money comes to their hand. However, level of education is equally an advantage as age and marital status. This is in line with the research work in Limpopo, South Africa (Sithole *et al; 2009*), Ilori, Kwara State Nigeria (Kayode *et al; 2013*), Jos, Plateau State, Nigeria (Olukorede &Oluyinka, 2012) and Owerri, Nigeria (Ihekaire &Oji, 2017).

V. Conclusion

The economic impact of treating the eyes is huge and many people have been wrongly diagnosed of eye disease to the extent that a lot more diseases are underestimated because many people simply categorize inflammation as eye injury.

Thus, exposure to the radiations emitted during welding at the welder's work environment withoutappropriate protection gear mainly produce the ocular conditions, including pterygium,photokeratitis and cataract etc with their major symptoms, such as burning sensations, photophobia and eye pain.

It is equally observed from the research that Corneal scar on left cornea are found mostly by the welders via eye screening with high level of people suffering of cataract as observed in questionnaire.

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Competing Interest

The authors declare that they have no competing interests

Availability of data and materials

The datasets used and /or analysed during the current study are available from the corresponding author on reasonable request.

Consent for publication

Not applicable

Ethics approval and consent to participate

The study was approved by the ethical committee of the School of Basic Medical Sciences, College of Medicine and Health Sciences, Abia State University, Uturu. Permission was obtained from the office of the executive secretary of AhiazuMbaiseLocal Government Area and traditional rulers of the various community studied. Informed concept was signed by all the participants before they were allowed to take part in the study.