ASSESSMENT OF AWARENESS AND PERSONAL PROTECTIVE EYEWEAR USAGE AMONG WORKERS OF SMALL- SCALE ENTERPRISES IN JIMMA CITY

BY TEKALIGN ESHETU (MD, 4th YEAR OPHTHALMOLOGY RESIDENT)

ADIVISORS

DR. JAFER KEDIR (MD, ANTERIOR SEGMENT SUB-SPECIALIST, ASSOCIATE PROFESSOR OF OPHTHALMOLOGY)

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A RESEARCH THESIS TO BE SUBMITTED TO JIMMA UNIVERSITY INSTITIUTE HEALTH SCIENCES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE SPECIALITY CERTIFICATE IN OPHTHALMOLOGY.

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JIMMA, ETHIOPIA

JIMMA UNIVERSITY INSTITIUTE OF HEALTH SCIENCES, FACULTY OF MEDICINE, DEPARTEMENT OF OPTHALMOLOGY

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ABSTRACT

Background:

For greater production and productivity, safe work and workplace are required, and so promotion and protection of safe work and workplace are complementary parts of industrial development. Industrial jobs, on the other hand, may produce hazardous labor and working conditions due to intrinsic hazards in their materials, processes, technology, or products. People working at industrial facilities, as well as the general public in the surrounding area and the environment in general, may be at risk of accidents and work-related diseases.

Eye injuries do not happen at random. The majority of eye injuries have a clear link to the type of job and activity performed at the time of the accident. Because of their jobs, some people are at a higher risk of getting eye injuries. Small-scale and large-scale industrial workers are among these individuals.

With regard to Jimma Medical Center, Department of Ophthalmology, it is not uncommon to see repeated outpatient visits as a result of ocular trauma at workplace which raises the issue of awareness on ocular personal protective equipment usage among workers in small scale enterprises in Jimma city.

Objective: The aim of this study is to assess awareness and personal protective eyewear (PPE) usage practice at workplace of workers in small scale enterprises in Jimma city.

Method: A cross-sectional community based descriptive study design is conducted from May 2021 to August 2021. A standardized questionnaire was used to collect data from randomly selected small-scale firm workers in Jimma city. The SPSS version 26.0 software package is used to conduct descriptive and logistic regression data analysis.

Result and discussion: A total of 214 workers of small-scale enterprises of welding, wood work, and wood and metal work are included in the study with 82(38.32%) from welding SSE, 125(58.41%) from wood work and 07 (3.27%) from metal and wood work SSEs.

All of the participants are male with mean age of 27.35 ± 7.22years and mean year of experience of 4.7±4.7 Years. Among the 82 welders, 98% mentioned flying tiny metallic chip foreign body, excessive light and chemical fumes as possible ocular trauma hazards at workplace. 94% of workers in wood work mentioned impact and dust particle foreign bodies as possible workplace hazards. All workers believe that workplace ocular trauma hazards are preventable and mentioned using PPE as a major preventive measure.

As a whole 47% of workers claims that they usually use PPE during working time. With regard to type of SSE 96.3% of welders; and only 16.8% of workers in woodwork claims to use PPE. Only 10.7% of the total workers used PPE always during working with the reason of not using always

being forgetting for 58.9% welders and negligence or thinking they are involved in low-risk activity (60.6%) and not being comfortable for 34% of workers in wood work. The study showed that 86.6% of workers has history of sustaining one or more types of ocular injury and most (88.3%) of workers didn't wear PPE by the time they sustain ocular injuries at work place.

Out of workers that are observed wearing PPE at workplace, only 15.6% of them used the recommended standard. The study showed that using PPE always during working time and using the recommended standard is associated with decreased occurrence of ocular injury at work place ($p<0.001$)

Key terms: personal protective equipment, small scale enterprises, eyewear, occupational safety, occupational hazard, ocular injury

ACKNOWLEDGMENT

First of all, I want to thank God for keeping me safe throughout the difficult time. And also, my foremost gratitude goes to my advisors who helped me for conducting tis research. I also want to acknowledge my friends, my family and all my colleagues who were supporting me throughout the whole period of conducting this research. Finally, I like to acknowledge Jimma University for sponsoring this research.

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ACRONYMS

OSHA: OCCUPATIONAL SAFTEY AND HEALTH ADMINSTARTION

PPE: PERSONAL PROTECTIVE EYEWEAR

WHO: WORLD HEALTH ORGANIZATION

SSE: SMALL-SCALE ENTERPRISES

UVR: ULTRA VIOLATE RAY

JU CBE: JIMMA UNIVERSITY COMMUNITY BASED EDUCATION

JU CHS: JIMMA UNIVERSITY COLLEGE OF HEALTH SCIENCE

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

The workplace is a priority setting for health promotion in the twenty-first century, according to the World Health Organization (WHO). The workplace, like other places where WHO has established health-promoting efforts (schools, cities, hospitals, and businesses), may have a huge impact on the health and well-being of workers, their families, communities, and society at large (1).

For greater production and productivity, safe work and workplace are required, and so promotion and protection of safe work and workplace are complementary parts of industrial development. Industrial jobs, on the other hand, may produce hazardous labor and working conditions due to intrinsic hazards in their materials, processes, technology, or products. People working at industrial facilities, as well as the general public in the surrounding area and the environment in general, may be at risk of accidents and work-related diseases (2).

Ocular trauma is the most common cause of unilateral blindness today, with 1.6 million persons blind, 2.3 million visually impaired bilaterally owing to eye injuries, and another 19 million having unilateral vision loss (3).

Despite health education and other primary prevention efforts, ocular injuries, particularly work-related accidents, are still common today, and the eye is a high-risk organ for such an accident. Ocular injuries is extremely common, while accounting for only 0.27 percent of total body area and 4% of facial area (4). Some of the established risk factors for ocular trauma include male gender, poorer socioeconomic level, younger age, and occupation (5).

Classifying enterprises into small and large scale is not an easy matter. The World Health Organization suggests that any enterprise employing less than 50 workers should be considered as Small Scale Enterprises or Industries (6).

Currently, Data received from Jimma city small-scale enterprises and industries admiration shows that 38 Metalwork and 30 Woodwork small scale enterprises (a total of 68) are found in Jimma city.

1.2 STATEMENT OF THE PROBLEM

The workplace is a crucial part of a person's surroundings, and no employment is without risk. Occupational dangers have become a serious public health problem as a result of increased construction activities (many of which entail welding) as a result of increased urbanization and industrialization around the world. Hazards arising from workplaces could impair the health and well-being of the workers; therefore, it is necessary to anticipate, recognize, evaluate and control such hazards (7).

Eye injuries are prevalent, and they are one of the leading causes of avoidable blindness. They are a common cause of visual morbidity in the workplace around the world (8). Every year, about 2.5 million people suffer from eye injuries. Every year, more than 500,000 people are blinded around the world (9).

Eye injuries do not happen at random. The majority of eye injuries have a clear link to the type of job and activity performed at the time of the accident. Because of their jobs, some people are at a higher risk of getting eye injuries. Small-scale and large-scale industrial workers are among these folks. Welders are at a particularly high risk of eye injury due to their exposure to metals and ultraviolet light ((10).

According to a study of occupational injuries among welders in Northwest Iran, 92 percent of welders had problems with their eyes (11). Welders suffer occupational eye injuries due to ocular risks such as welding flash burns, flying metal objects, toxic metal fumes, particulate matter, and thermal burns (12).

Even when welders are not welding, they may be exposed to sparks from nearby welders (13). Around half of all welder flash injuries are thought to occur in coworkers who are regularly in the vicinity of where welding is taking place but are not involved in the welding process (14).

In study done at Jimma University, Department of Ophthalmology, College of Health Sciences Jimma, Ethiopia in 2014, Majority of the eye injuries (53.2%) were work - related. None of the patients with work -related eye injuries had eye protection at the time of injury (15).

Personal protection equipment (PPE) is a recommended and safe practice for metal workers to use at all times to protect themselves from hazards and injuries while welding or cutting. Welders who use proper eye protection save approximately 90% of eye damage (16). As a result, the cost of ocular injuries in terms of medical treatment, lost income, and rehabilitation services, when warranted, fully justifies the enhancement of preventative measures (17).

1.3 STUDY SIGNIFICANCE

With regard to Jimma university, department of ophthalmology, it is common to encounter patients presenting with complaint of ocular injury at work place. Workers' level of awareness of workplace dangers, adherence to safety measures addressing ocular trauma exposure, and use of ocular personal protective eyewear (PPE) were inquired. This study aims to answer questions that arise concerning PPE usage and awareness of workers on ocular hazards at work place and preventive measure. Since there is no such study done previously in the city, this study will fill the gap that exist and it will also serve as a starting point for future research on related topics.

CHAPTER 2: LITERATURE REVIEW

According to a cross-sectional study of 260 welders in Nepal, 90.7 percent of welders were aware of one or more welding dangers. The most common hazard cited by the welders operating in the vicinity was excessive brightness (90.7 percent). Ninety percent of welders were aware of at least one type of PPE, yet only 47.7% of welders employ at least one type of PPE while on the job. While welding goggles/eye shields were the most generally reported PPE for use (86.7 percent). 74.3 percent of the 260 welders who reported being aware of welding goggles/eye shields as PPE thought sunglasses were protective and utilized them as a personal protective device (18).

Field-based cross-sectional research of 500 welding employees in Al-Ain City, UAE, found that they had a high level of knowledge of the availability of safety goggles, glasses, face shields, and welding helmets when compared to filter lenses. No one wore the safety goggles or glasses that were available all of the time. Only 5% of workers said they never utilized any kind of personal protective equipment at work. The biggest reason for not wearing PPE was the pressure to finish the job (95%); also, 75 percent reported impaired vision via PPE lenses, and 10% saw no value in wearing it. PPE usage was associated with younger age and fewer job experience (P 0.0001) (19).

In a cross-sectional survey of 60 welders in a tier 2 city in south India, it was observed that 95% were aware of eye hazards and protective equipment. Only 45 percent of them, though, said they used PPE on a regular basis. According to ITI (industry training institution) staff, the most important factors for using PPE were a higher level of literacy and formal training in industrial jobs. The grounds for not wearing PPE were a lack of reinforcement and the unrealistic notion that they were undertaking a low-risk job (20).

A study of 150 welders in the Limpopo province of South Africa found that 89.0 percent of them reported using PPE while working. Helmets (57 percent), goggles (22 percent), and face shields were the most commonly used protective eyewear (15%). However, 60% of those surveyed wore ineffective protection eyewear, such as sunglasses. Sixty-one percent said they had been exposed to welding flashes on occasion while not using eye protection. Although the majority of the welders utilized safety gear during welding, a minority did not always use such devices. Ninety-one percent of welders said they understand the need of using protective equipment while welding. Seventy-two percent stated that welding could cause eye damage if safety precautions are not taken. Seventy-two percent said that if safety precautions are not performed, welding could cause eye damage. They came to the conclusion that welders' eye protection methods appeared to be insufficient to avoid welding-related dangers (21).

According to Study done in Sokoto, Nigeria, on 280 welders, most of the respondents were aware of the accidents and injuries welders are exposed to at the workplace. Eye injuries were amongst the commonest injuries encountered at workplace. Out of eye injuries, 86.8% was due to sparks and 85.7% were due to burns from fire or explosions (22). Almost all, 278 (99.3%) of the 280 respondents had good knowledge of prevention of welders' workplace hazards, accidents and injuries. The preventive measures most commonly known to the respondents were use of personal protective equipment (99.3%). Majority, 186 (66.4%) of the 280 respondents consistently wear eye goggles (22).

Cross-sectional research of 382 welders in Ghana found that the overall prevalence of eye injuries was 47.9%, with electric/arc welders having a higher rate (73.7%). Higher monthly income, non-usage of eye PPE while working, and insufficient training on the use of eye personal protective equipment were all factors linked to eye injuries. 58 percent of welders believe that wearing PPE is not required, whereas 22 percent believe that wearing PPE hinders productivity (23).

A work site-based cross-sectional study conducted among 555 welding employees in Lideta Sub-City, Addis Ababa, Ethiopia showed that 91.8% of them used eye goggle as PPE during welding. Two-thirds, 66.8 %, of the workers reported they experienced at least one health complaint related to their work. The most common complaints were 99.6 % vision problems. The majority, 86.5 %, of participants were aware of occupational hazards that might occur during the welding process (24).

CHAPTER 3: OBJECTIVE

3.1 General objective

To assess the usage of personal protective eyewear among workers of small-scale workshops in Jimma city

3.2 Specific objectives

3.2.1 To assess workers PPE usage at work place.

3.2.2 To assess worker's awareness on possible work place associated ocular injury.

3.2.3 To assess factors affecting PPE usage.

CHAPTER 4: METHODOLOGY

4.1 Study Area and study period

4.1.1 Study Area

The research is conducted in Jimma City, one of the zones of Ethiopia's Oromia Region, 352 kilometers south of Addis Ababa and at an elevation of 1760 meters. The city covers 44.8 square kilometers in size and has a total population of 120,960 people, according to the Central Statistical Agency (CSA, 2007), with 60,824 men and 60,136 women (25).

4.1.2 Study period

Study is conducted from May 2021 to August 2021

4.2 Study design

Community-based cross-sectional study design is employed

4.3 Population

4.3.1 Source population

All workers in small-scale workshops that are found in Jimma city

4.3.2 Study population

Workers in wood and metal small-scale workshops in Jimma city who are active during the study period and that works in welding, carpentries

4.4. Inclusion and exclusion criteria

4.4.1 Inclusion criteria:

- Workers who have an active involvement in a workshop as a main or a coworker.

4.4.2 Exclusion criteria:

- Workers working in multiple metal or woodwork small-scale enterprises are excluded.

4.5 Sample size and sampling technique

Simple proportion formula is used taking prevalence of workplace ocular injury in study done among welders in tier 2 city, south India, which is 67% and 95% confidence interval (CI-95%), taking margin of error 5%.

Sample size is calculated by the formula

$$n = (z\frac{\propto}{2})^2 * p\ (1\text{-}p)/d^2$$

Where,

n=the required sample size,

d = margin of error

Z α/2= 95%confidence interval (C.I) =1.96

P= proportion for unknown population=0.5

The n= $(1.96)^2*0.67*0.33/0.05^2$=3.8416*0.22/0.0025

n=339

Since total number of study population is below 10,000 (which is 567), using correction formula N=567 (data received from Jimma city small scale enterprises administration)

Nf =n/ (1+n/N) =339/(1+339/567)=**213**

4.5.1 Sampling Technique

Currently, Data received from Jimma city small-scale enterprises and industries administration shows that 38 Metalwork and 30 Woodwork small scale enterprises (a total of 68) are found in Jimma city. The data shows that there are a total of 567 workers in these 68 workshops with average number of workers of 8 workers in each. Taking each work shop as a cluster and taking the average number of workers in each workshop which is 8 workers, 30 workshops are selected by simple random sampling and data is collected from 214 workers. Data is collected from all workers within selected workshops.

4.6 Variables

Dependent variables

Usage of Personal Protective Eyewear (PPE)

Independent variables

Age

Sex

Type of small-scale enterprise

Level of education

Marital status

Annual income

Smoking

Drinking alcohol

Chewing chat

Length of working time

Work experience

Awareness on workplace associated ocular traumas

Attitude toward usage of PPE

History of ocular trauma at work place

Reasons for not using PPE

Availability of PPE

Negligence to use PPE

Not being comfortable when using PPE

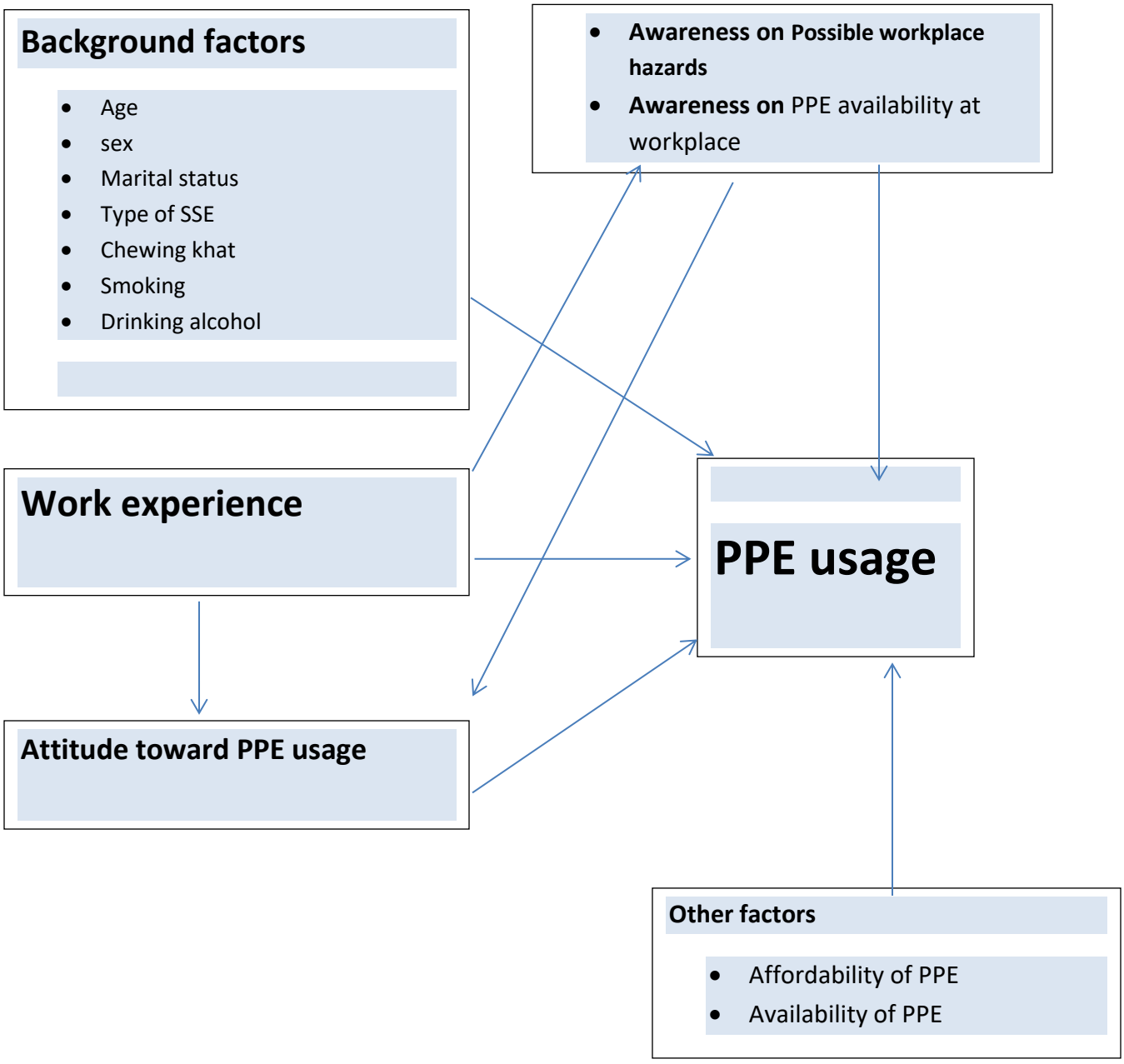
Forgetting to use PPE

Owner not providing PPE

Use of recommended type of PPE

Use of recommended standard of PPE

Figure 1: Conceptual Framework



4.7. Data Collection Procedure

Pretested, structured questionnaire is used to collect data. The workers are informed about the research. Socio-demographic data is collected, and direct observation is done by a trained ophthalmic nurse. Personal habit; work experience; length of working time; awareness of possible ocular hazard at work place; whether the workers are trained for the work or not; whether they use PPE or not; the type of PPE used; and the reason for not using PPE, like lack of awareness of PPE usage, negative attitude towards PPE usage, affordability, availability, discomfort when using PPE, fogging of PPE and others are asked for and recorded.

Then, the use of PPE at the time of interview is observed and documented by the data collector. For those using PPE, the type and the appropriate recommended specification and standard of PPE is checked and documented by the data collector. The appropriate and recommended PPE for different activities is listed in table 4.1.

OSHA recommendation of PPE for different activity

Table 1: OSHA recommendation of PPE for different activities

Category of work	**activity**	**hazard**	**Recommended PPE**
Metal work	Electric arc welding Cutting, grinding	Flying fragments, objects, large chips, Optical radiation	Spectacles with side protection, face shields, Welding helmets or welding shields
Wood work	sawing, drilling, chiseling, powered fastening,	Dusts, Flying fragments, objects	Eye Goggles(eyecup and cover types)

4.8 Data Analysis

The data collected is exported to SPSS after entered into Epidata version 3.1. It is cleaned and coded using SPSS version 26.0 for analysis. Descriptive statistics (frequencies and percentages) is analyzed to show the picture of the data. Analysis for crude and adjusted odds ratios together with their corresponding 95% confidence is done at a P value < 0.05. Initial binary logistic analysis for dependent variables is done and those with p value of 0.25 are included in multivariate analysis.

4.9 Data Quality Control

Data is collected by a trained Ophthalmic Nurses. Two-day training is given for data collectors regarding study objective, interview techniques, measurements and ethical issues during data collection. Pretest is done in 5% of the total sample size two weeks before the actual data collection time in order to assess its clarity, length, completeness and consistency, language barriers and contextual gaps on the structured questionnaires. The questionnaire is also translated in to Afaan Oromoo and Amharic for better understanding. Questionnaire is checked daily for accuracy, consistency, and completeness.

4.10 Ethical Considerations

The study is conducted based on basic principles of World Medical Association Declaration of Helsinki. The study is conducted after Ethical review committee of Jimma University College of Health Sciences has approved the proposal and provided a support letter. This support letter was given to the head of Jimma Medical Center. Each study participant was informed about the purpose of the research and reassured that confidentiality of information will be maintained during data collection, analysis, interpretation and publication of results. Workers are encouraged to use PPE at the end of the interview and are briefed with recommended standards of PPE for different activities.

4.11 Operational Definitions

Small Scale enterprises: workshops with less than 50 employees according to WHO classification(6)

Worker: main worker and co-worker

Bystander: worker or some one else not actively involved in activity, but at risk of sustaining ocular injury

Ocular PPE: eye goggles, helmets, filter glasses, face shield according to **OSHA** standard()

Use ocular PPE: If he/she wears OSHA standard PPE for specified workplace

Always: All the time while working

Sometimes: The time PPE used is less than the time PPE is not used

Rarely: The time PPE used is less than the time PPE is not used

Usually: The time PPE used is greater than time not used

Use substance: if the respondent smoke cigarettes or chew khat or drink alcohol

Awareness of PPE usage: mention the recommended type of PPE for the possible ocular trauma hazard associated with the specific type of activity the worker is involved in

Aware of ocular trauma hazards at work place: Mention at least one possible ocular trauma hazard at work place

Impact; Flying fragments, objects, large chips, particles sand, dirt

Chemicals; Splash, fumes, vapors, and irritating mists

Optical Radiation; Radiant energy, glare, and intense light

Aware of ocular PPE standard; mention recommended type of PPE for the specific type of activity that corresponds to OSHA standard (), annex III

Literate; can read and write

Illiterate; cannot read and write

4.12 Plans for Dissemination of Findings

Findings of this research will be distributed to Jimma University postgraduate and research study office. It will be presented on a national ophthalmic association meeting. It will also be made available for a publication on international journals. Further, it will be uploaded and made available on the Website of Jimma University.

CHAPTER 5: Result

5.1: Socio-demographic Characteristics

Data were collected from a total of 214 workers of wood and metal SSE in Jimma city from August 1 to September 30, 2021. Out of the 214 workers, 82 (38.3%) were welders and 125(58.4%) wood work while 7(3.3%) works in both metal and wood work Enterprises.

All workers were men with a mean age of 27.35 ± 7.225 years. Almost half (46.73%) of the workers were in the age group of 18-25years, 42.06% are in the age range of 26-35 while 11.21% are above 35 years. Sixty one percent of workers have completed high school while 21% and 16.8% of them have educational level of elementary school and diploma and above respectively. The majority of workers (69.63%) have work experience of less than 5 years. There were 8.8% of workers working for more than 10 years. The mean duration of employment of the welders in years in this study was 4.7±4.7 years. The sample is found to have normal distribution (Fig 1).

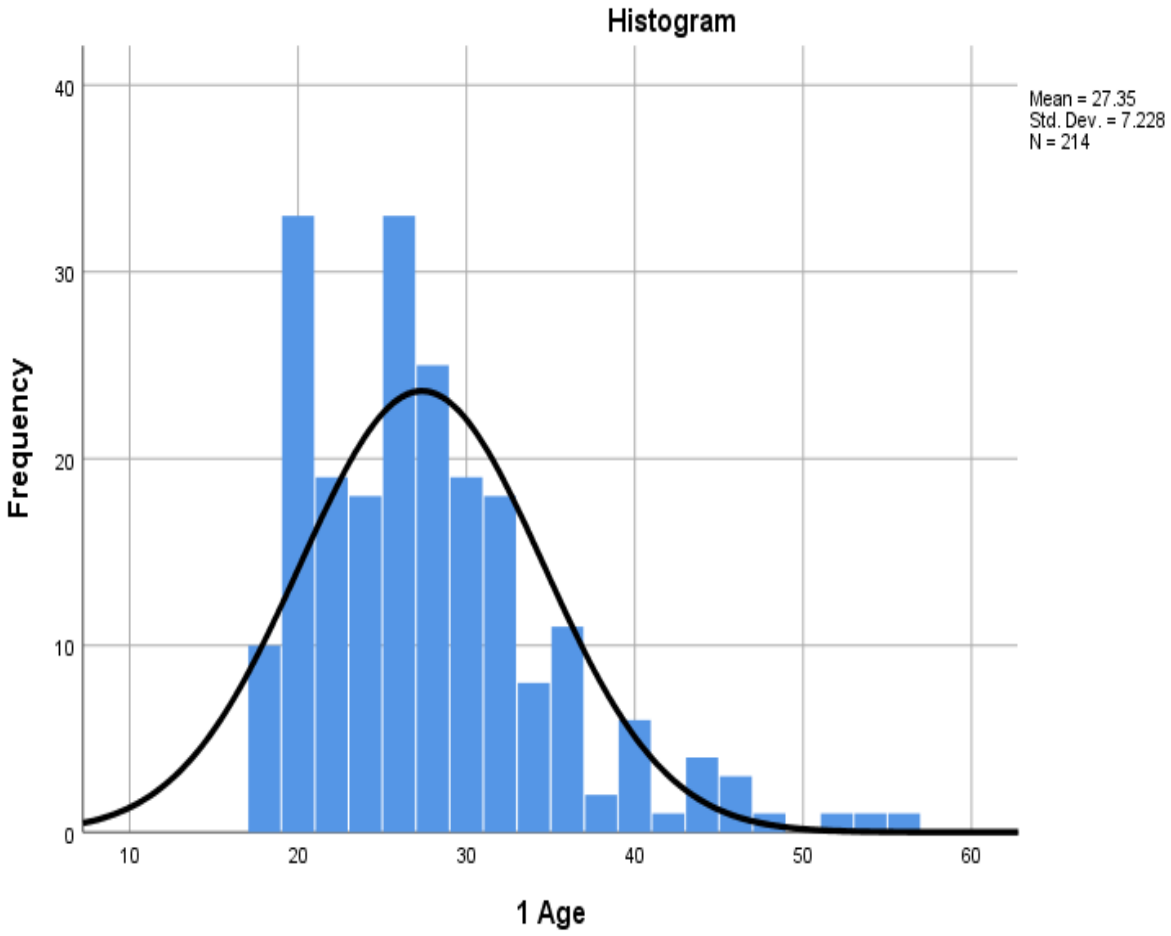


Figure 2: sample distribution

Table 2 : Socio-demographic Characteristics of SSE workers in Jimma city, Ethiopia, 2021

Variables		Wood work	Welding	Both welding and wood work
Age	18-25	64 (51.2%)	32 (39%)	4 (57.14%)
	26-35	53 (42.4%	35 (42.6%)	2 (28.6%)
	>35	8 (6.4%)	15 (18.28%)	1 (14.3%)
	Mean age	27.35 ± 7.22		
Educational level	Elementary	21 (16.8%)	23 (28%)	1 (14.3%)
	High school	83 (66.4%)	45 (54.8%)	5 (71.4)
	Diploma and above	21 (16.8%)	14 (17%)	1 (14.3%)
Duration on work (in Years)	0-5	95 (76%)	49 (59.7%)	5 (71.4)
	6-10	23 (18.4%)	22 (26.8%)	1 (14.3%)
	>10	7 (5.6%)	11 (13.4%)	1 (14.3%)
	Mean duration on work	4.7±4.7		
Marital status	Single	89 (71.2%)	46 (56%)	6 (85.7%)
	Married	36 (28.8%)	33 (40.24%)	1 (14.3%)
	Divorced	0	3 (3.6%)	0
Habits	Use substance [a]	64 (51.2%)	59 (71.9%)	3 (42.8%)
	Do not use substances	61 (48.8%)	23 (28%)	4 (57.1%)
Formal training [b]	Trained	19 (15.2%)	13 (15.8%)	0
	Not trained	106(84.8%)	69 (84.1%)	7 (100%)

a. If the workers smoke cigarette, chew khat or drink alcohol
b. If trained in governmental or private institute

Most of the workers are single (65.89%), while 32.7% of them are married. Small proportion (0.47% are divorced. Among the 214 workers, 34.1%, 6.1% and 41.1% of the workers reported to drink alcohol, smoke cigarettes and chew khat respectively. The study showed that only 13.6% of the workers have formal training.

5.2: Awareness of possible ocular hazards and types of PPE for specific SSE type

The study showed that all of the workers are aware of one or more workplace associated ocular hazards at work place. Impact (98.8%), Excessive light (96.4%) and chemical fumes (72.3%) were the most common hazard identified by the welders while dust (94.4%) and impact (90.3) were the most common hazards identified by wood workers (See table 3).

Most workers (97.66 %) were aware of at least one kind of PPE for the specific type of SSE and eye goggle (98.6%) is mentioned by workers in wood work and eyeglass (87.8) by welders.

Table 3: Awareness of ocular hazards, types of PPE and PPE usage among welders in jimma city, Ethiopia, 2021

Variables		Workers number unless specified		
		Wood work	Welding	Both wood work and welding
Possible ocular hazards mentioned by workers*	Impact	113 (90.4%)	81 (98.8%)	6 (85.7%)
	Dust	117 (93.6%)	24 (29.2%)	6 (85.7%)
	Chemical fumes	52 (41.6%)	60 (73.1%)	2 (28.6%)
	Excessive light	0	79 (96.3%)	2 (28.6%)
Use PPE during working	Yes	22 (17.6%)	79 (96.3%)	2 (28.6%)
	No	103 (82.4%)	5 (6%)	5 (71.4%)
PPE usage	Eye glass	0	79 (96.3%)	1 (14.3%)
	Eye goggle	21 (16.8%)	0	1 (14.3%)
	Welding helmet	0	5 (6%)	0
	Face shields	1 (0.8%)	0 (	0
	Not using	103 (82.4%)	5 (6%)	5 (71.4%)
Frequency of PPE usage	Always	2 (1.6%)	9 (11%)	0
	Usually	2 (1.6%)	69 (84.1%)	2 (28.6%)
	Some times	14 (11.2%)	0	0
	Rarely	4 (3.2%)	1 (1.2%)	0
	Not using	103 (82.4%)	3 (3.6%)	5 (71.4%)
Recommended standard used on observation	Yes	3 (2.4%)	12(15.6%)	1 (14.3%)
	No	0	77 (93.9%)	1 (14.3%)
	Dust	116(92.8%)	31 (37.8%)	4 (57.1%)
Type of ocular injury sustained on work	Metallic chips	0	70(85.4)	3 (42.8%)
	Chemical fumes	26(20.8%)	33(40.24%)	4 (57.1%)
	Blunt trauma	13(10.4%)	1(1.2%)	0
	Excessive light	0	58(70.7%)	4 (57.1%)

*= Numbers and percent cannot be added up due to many respondents have mentioned multiple hazards

5.3: Usage of PPE

Only "47.7%" of workers used at least one kind of PPE during work. However within the specific type of SSE, "96.6% "of welders use PPE, among which eye glasses (96.3%) were the most commonly reported PPE for use. Only 16.8% of workers in wood work used PPE and the most commonly worn PPE was eye goggle. (95%).

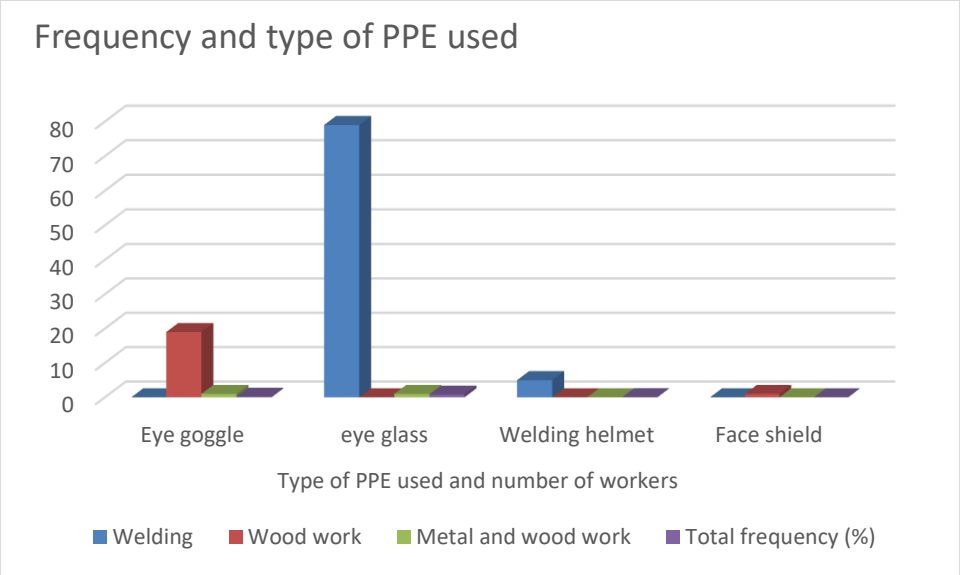


Figure 3: Types of commonly used PPE for different types of SSE

Observation of workers who are found wearing PPE during interviewing, found that only15.6% % of them used the recommended type and standard of PPE for the specific activity they are involved in (Table 4). **Sunglasses** were considered protective and were used as a personal protective device by 84.3% of the 83 welders who reported being aware about welding goggles/eyeglasses as PPE. None of them was observed using welding helmet or face shield.

Out of the 102 workers that claims they use PPE, only 10.7 % of them use PPE on always basis (table 4). Among 82 welders, 78 (95%) often used PPE out of which 9 (11.5%) used it on always basis. Among the 125 wood workers, only 22 (17.6%) occasionally used PPE. The most frequently mentioned reason for not always using PPE being negligence or unrealistic thought of being involved in low-risk activities (50%), forgetting (22.1%) and not being comfortable while using PPE (22.6%). With regard to type of SSE, forgetting (58.9%) for welders, and negligence (60.6%, 57%) for workers of woodwork, and wood and metal work workers, are the main reasons of not always using PPE ($p<0.001$) Pearson chi square test (table 5).

Figure 4: Recommended welding eyeglasses

Figure 5: Photo of sunglasses workers using

Table 4: Frequency of PPE usage by welders and wood workers for specific types of SSE in Jimma city, Ethiopia, 2021

	welding	Wood work	Wood work and welding	P-Value*
Always	9 (11.4%)	2	0	
Usually	69 (87.3%)	2	2	P<0.001
Some times	0	14 (63.6%)	0	
Rarely	1	4	0	
Total	79	22	2	

*=fisher's exact test

Table 5: Reason for not using PPE always against type of SSE for welders and wood workers in Jimma city, Ethiopia, 2021

		Reason for not using PPE on always basis				
		Negligence	Not being comfortable	Owner not providing	Forgetting	P-Value *
Type of SSE	welding	24 (23%)	3 (6.5%	3	43 **(95.5%)**	P<0.001
	Wood work	**76 (73%**	**42 (91.3%**	5	0	
	Wood work and welding	4 (3.8%	1	0	2	
Total		104 (51.2%	46 (22.6)	8 (3.9%)	45 (22.1)	

*= Fisher exact test indicates the significant difference in distribution of variable 'reason for not using PPE always'

Level of education, being in different age groups, having formal training, type of SSE, marital status and using substance have showed association with use of PPE during working (Table:6) (chi-square test).

Table 6: PPE usage among SSE workers among workers of SSE in Jimma city, Ethiopia, 2021

Variables	PPE usage		
	yes	No	p-value*
Age in range			0.018
18-25	38 (36.9%)	62 (55.8%)	
26-35	50 (48.5%)	40 (36%)	
>35	15 (14.6%)	9 (8.1%)	
Level of education			0.039
elementary	27 (26.2%)	18 (16.2%)	
High School	55 (53.4%)	78 (70.3%)	
Diploma and above	21 (20.4%)	15 (13.5%)	
Having formal training [a]			0.016
yes	20 (19.4%)	9 (8.1%)	
no	83 (80.6%)	102 (91.9%)	
Work experience			0.068
0-5	64 (62.1%)	85 (76.6%)	
6-10	27 (26.2%)	19 (17.11%)	
>10	12 (11.6%)	7 (6.3%)	
Marital status			0.003
single	57 (55.3%)	84 (75.7%)	
married	43 (41.7%)	27 (24.3%)	
divorced	3 (2.9%)	0	
Use substance [b]			<0.001
yes	76 (73.8%)	51(45.9%)	
no	27 (26.2%)	60 (54%)	
Type of SSE			<0.001
welding	79 (76.7%)	3 (2.7%)	
Wood work	22 (21.3%)	103 (92.8%)	
Metal and wood work	2 (1.9%)	5 (4.55)	

*=Chi-square test

a, formal training: if trained and have certificate for it

b, use substance: if he/she smokes cigarette, chew khat or drink alcohol

Eighty seven percent of the workers (188/214) have sustained one or more type of ocular injury during the working time; most of injuries (88.8) occurring while working without using PPE (p=0.007, table 7). Most workers 78.7% (148) sustain injury while working by themselves and 16.5% (31) of the workers were assisting others. About 4.8% (9) of workers sustained ocular injury while they were just bystander (Table 7, Table 8). occurrence of ocular injury and wearing PPE has shown association while there is no association between role of the worker and occasion of sustaining ocular injury. The study also indicates that there is no association between type of SSE and sustaining at least one type of ocular injury at workplace. **Metallic chip foreign body** was the

most frequently encountered injury for welders (p<0.001) and **dust particles foreign body** was the most frequently encountered by woodwork workers (p<0.001) Pearson chi square test (table 9).

Table 7: status of PPE usage by the time of sustaining ocular injury among workers of SSE in Jimma city, Ethiopia, 2021

		Wearing PPE by the time of sustaining injury			P-value*
	Type of PPE	Yes	No	Total	
Sustained one or more types of ocular injury **(Yes)**	Welding	14	57 (80.3%)	71	0.007
	Wood work	6	105 (94.6%)	111	
	Both Wood work and welding	1	5	6	
Total		21 (11.2%)	167 (88.8%)	188	

*= Fisher's exact test

Table 8: Sustained ocular injury during working and role among workers of SSE in Jimma city, Ethiopia, 2021

Variables		Welding (N=71	Wood work(111)	Both wood work and welding(N=6)	Total	P- value*
Role when sustaining injury	Working by self	53	90	5	148 (78.7%)	0.879
	bystander	3	6	0	9	
	assisting others	15	15	1	31	

*=fisher's exact test

Table 9: Type of SSE against type of injury for those who sustain injury

	Welding (N=71	Woodwork (N= 111)	Both wood work and welding (N=6)	P-Value *
Metallic chip	**70 (98.6%)**	0	3 (50%)	<0.001
Dust	0	**111(100%)**	4 (66.7%)	<0.001
Chemical fumes	**33 (46.5%)**	26 (23.4%)	4 (66.7%)	0.006
Excessive light	**58 (81.7%)**	0	4 (66.7%)	0.162
Blunt injury	1	13 (11.7%)	0	0.358

*=fisher exact test

The study found that type of SSE and having formal training are among the factors that have strong association with PPE usage at work place. workers that have formal training are more likely to use PPE at work place (p<0.001) and welders are the most frequent users of PPE (p<0.001 AOR=60.3) (Table 10). For workers who claims using PPE, Multivariate analysis shows that, workers that have formal training are more likely to use the standard PPE (P=0.008, AOR=31.03) (table 11). Multivariate analysis of variables that have significance of <0.25 indicates that, only using PPE on always basis is significantly associated with reduction of risk of ocular injury. The study showed that workers that use PPE always are less likely to sustain ocular injury at workplace (p=0.004, AOR=0.006) (Table12). Controlling the frequency of PPE usage, multivariate analysis shows that using standard PPE is not significantly associated with decreased risk of sustaining ocular.

Table 10: Multivariate logistic regression for factors affecting PPE usage among workers of SSE in Jimma city, Ethiopia, 2021

Variables	Response of 'yes' for PPE usage at work		
		P- value	95% C.I. for Adjusted Odds Ratio (AOR)
Type of SSE		**<0.001**	
	Welding	<0.001	60.301 (6.92, 525.457)
	Wood work	0.216	0.304 (0.04, 2.002)
	Both wood and metal work		1
Having formal training		**<0.001**	**9.77 (2.81-34.11)**
Using substance		0.073	0.338 (0.104-1.104)
Educational level		0.144	
	Elementary		1
	High school	0.798	0.362 (0.072-1.815)
	Diploma and above	0.188	0.272 (0.078-0.950)
work experience (in years)		**0.049**	
	0-5		1
	6-10	0.017	5.640 (1.364-23.317)
	>10	0.785	0.776 (0.126-4.798)

Table 11: Multivariate analysis of factors affecting usage of standard PPE among workers of SSE in Jimma city, Ethiopia, 2021

Variables	Standard PPE usage		
		P- value	95% C.I for Odds ratio (OR)
Having formal training		**0.008**	**31.03 (2.489-386.88)**
Educational level		0.641	
	elementary		1
	Highschool	0.084	25.16 (0.649-976.02)
	Diploma and above	0.872	0.824 (0.547-2.638)
Work experience in years		0.200	
	0-5		1
	6-10	0.671	0.551 (0.035-8.601)
	>10	0.127	11.987 (0.495-290.43)
Age in range		0.189	
	18-25		1
	26-35	0.123	0.151 (0.014-1.664)
	>35	0.090	0.033 (0.001-1.711)

Table12: Multivariate analysis of factors affecting occurrence ocular injury at workplace among workers of SSE in Jimma city, Ethiopia, 2021

Variables	df	Sig.	AOR, 95% C.I. for AOR
Use PPE always (yes)		**.004**	**.006 (.000-.193)**
No			**1**
Education level	2	**.036**	
Elementary			1
High school	1	.053	12.444 (.972-159.380)
Diploma and above	1	.061	.021 (.000-1.197)
Type of SSE	2	.308	
welding	1	1.000	.542 (0.025-7.601)
Wood work	1	.999	.032 (.001-1.217)
Both welding and woodwork			1
Using substance	1	.483	.408 (.033-4.989)
Having formal training	1	.620	2.113 (.110-40.598)
Using standard PPE	1	.509	2.434 (.173-34.183)
Experience in years	2	.237	
<5 years			1
5-10 years	1	.502	2.450 (.179-33.563)
>10 years	1	.162	.068 (.002-2.960)
age in range	2	.297	
18-25			1
26-35	1	.137	18.308 (.398-842.161)
>35	1	.223	15.385 (.190-1247.269)

CHAPTER: 6 DISCUSSION AND CONCLUSSION

6.1: Discussion

The welders in this study were relatively younger (mean age =27.35 ± 7.22years) than the welders in a study done in Sokoto, Nigeria that reported a mean age of 30.98 ± 9.42 years, mean age of 29.43 ± 12.86 years in tier 2 city south India, and mean age of 31.29 ± 6.57 years from study done in southern Nepal (18). All the respondents were males, whereas this is in consonance with the finding in a study among welders in Sokoto, Nigeria (22), tier 2 city south India (20), and study done in southern Nepal (18).

Almost all of our workers are literate which is higher than the study done in India in which (85%) were literate and a 93% in study by Budhathoki SS et al.(18) Most of the workers were educated up to secondary level (55%) for the study done by Budhathoki SS et al.(18), which is close to the finding of our study (65%).

Among 214 workers, only 32 (15%) of workers;13/82 (15.8%) of welders and 19/125 (15.2%) of wood work workers) have formal training which is much less than 41.7% of welders reported by study done in a tier 2 city, south India (20), 82% in study by Lombardi DA, et, al(27), and 19% in study by Kumar, et, al. (28). The awareness of at least one type of workplace hazards by almost all the respondents in this study is comparable with the 90.7% awareness of workplace hazards obtained in study done among welders in Nepal (18), and the 86.5% awareness obtained among welders in Addis Ababa, Ethiopia (25), and 95% awareness obtained among welders in tier 2 city, south India (20).

This study shows only 10.7% of the welders used PPE always which is close to the finding of study done in Sokoto, Nigeria, which is 9.6 %. Among 82 welders 73 (89%) reported that they usually use PPE which is higher than 45% of 60 welders that said they use PPE usually in study done in tier 2 city, south India (20).

The inconsistent use was mainly attributed to negligence or unrealistic thought of that they are involved in low risk activity, forgetting, discomfort and poor vision or fogging which is comparable with the finding of the study done among welders in Sokoto, Nigeria (22), According to Lombardi DA et. al (27), poor fit, poor visibility due to fogging were the main reasons for not using PPE. Absence of reinforcement and presumed low risk task were the main reasons for non-usage in study done in south India (20).

Despite high levels of awareness of workplace accidents and injuries, poor utilization of personal protective equipment resulted in high work place associated ocular injury. Previous history of injuries was seen in 86.6% of the welders in our study which is higher as compared to 66.9% in Sokoto, Nigeria (22), 36.7%) India (12), and 71.7% in study by Lombardi DA et. al (27). Metallic chip foreign body was the most frequently encountered injury for welders ($p<0.001$) and dust particles foreign body was the most frequently encountered by woodwork workers ($p<0.001$).

This study also showed that use of recommended standard of PPE always is associated with significant reduction of ocular injury at workplace. However, only 15.6 % of welders used the recommended standard of PPE, mentioning good vision and being more comfortable when using

sunglass as PPE. The most commonly used eyewear was eyeglass which is sun glass for 84.4% welders, which is comparable with the finding reported by study done among 60 welders in tier 2 city south India in which, eyeglasses/goggles (73.3%) were the most commonly used PPE followed by face shield (65%) and helmets (45%). Welding helmet was used by only 5/82 (6%) of welders in this study which is much less than 45% in the study done in India (20).

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They also mentioned the sunglass to be protective of flying tiny metallic chips when grinding even if the long-term effect of UV light for which the sunglass may not be protective needs further research. Agreeably, most sunglasses with less than 1% UV-B and UV-A transmittance can provide adequate protection against ultraviolet radiation, they are usually limited when used during welding (29). Also, their lack of side shields for protection against flying particles, dust and fumes is a major limitation which may cause serious injuries to the eye.

6.2: Conclusion

The practice of using PPE among welders was very poor with regard to using it on always basis. They also mentioned the sunglass to be protective of flying tiny metallic chips when grinding even if the long-term effect of UV light for which the sunglass may not be protective needs further research. The study showed that using PPE always during working is associated with decreased occurrence of ocular injury at work place ($p<0.001$) while using the standard PPE didn't show significant association.

Strength

This study is the first for its kind to be done in Jimma university with regard to awareness and usage of personal protective eyewear (PPE) among welders and woodworkers in Jimma city.

Limitation

Small number of participants

6.3: Recommendations

It is not only enough to have the knowledge and attitude but the practice also needs to be monitored. This study showed that even sun-glasses are protective at least to flying tiny metallic foreign bodies and dust if worn on regular basis. It is crucial for bystanders and assistants as well to wear PPE. The long-term effect of UV light to the eyes of welders not always using PPE and sunglasses as PPE needs more extensive study and awareness creation measures needs to be implemented regularly. Strict supervision by supervisors and mandatory laws may help the welders to improve the use of PPE.

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ANNEX I: CONSENT FORM AND QUESTONAIRE

JIMMA UNIVERSITY INSTITUTE OF HEALTH SCIENCES

DEPARTMENT OF OPHTHALMOLOGY

Questionnaire prepared for data collection on the assessment awareness and personal protective eyewear usage among workers in small scale workshops in Jimma city. Verbal consent will be obtained before conducting the interview.

Greeting: Hello, how are you?

My name is Tekalign Eshetu. I am currently a final year resident at Jimma University Department of Ophthalmology, who is now going to conduct a community based cross-sectional study. I would like to interview you few questions.

The general purpose of this study is to assess awareness and personal protective eyewear usage among workers in small scale workshops in Jimma city to provide information for responsible authorities. Additionally, the finding of the study will be utilized develop appropriate strategy to promote PPE usage at work place and reduce ocular injuries.

Your name will not be written in the form and assure that your all information that you give will be kept strictly confidential. Your participation is voluntary and you are not obliged to answer any question you do not wish to answer. If you are not still comfortable with the interview, please feel free to stop it any time you like.

Do I have your permission to continue?

If yes, continue to the next page

If no, skip to the other participant.

Interviewer's name and code _____

Signature _____

Date of interview _____

Thank you for your cooperation!

Jimma University Institute of Health Science

Department of Ophthalmology

Questionnaire

A) Socio-demographic variables

1. Age_____
2. Sex
    - Male
    - female
3. Marital status
    - Married
    - Single
    - Divorced
    - Widowed
    - others
4. Education level
    - Illiterate
    - Basic
    - Elementary
    - High school
    - Diploma and above
5. Type of small-scale enterprise
    - Welding
    - woodwork
    - both welding and woodwork
6. Do you drink alcohol
    - Yes
    - No
7. If yes to question number 7, on what occasions
    - On weekends
    - On working days
    - On both working days and weekends
8. Do you smoke cigarettes
    - Yes

- No

9. Do you chew khat
    - Yes
    - No
10. If yes to question number 9, at what occasions do you chew khat
    - While working
    - Out of working time
11. For how long have you been in this work
    In years_____

B) Awareness of workplace related hazards and preventive measures

12. Have you taken formal training on workplace associated trauma hazards and how to prevent them?
    - Yes
    - No
13. Would you please mention some of possible eye traumas you think can occur?
    - Impact (flying metal chips, sharp instruments,)
    - Dust
    - Chemical
    - Radiation
    - Others(specify)_____
14. Do you think workplace ocular injury hazards are preventable?
    - Yes
    - No
15. If yes, to question number 14 what preventive measures do you know?
    _____

C) Personal Protective eyewear usage

16. do you use PPE during working times?
    - Yes
    - No
17. If yes to question number 16, which PPE do you use for your current work
    - Eye goggles
    - Filter glasses
    - Welding Helmets
    - Face shields
    - others
18. If yes to question number 16, how frequent do you use PPE
    - always

- usually
- sometimes
- rarely

19. If your answer to question number 16 is No, what are your reasons
    - It is not important
    - I don't know where to get or buy
    - I cannot afford to buy
    - The owner of the workshop didn't provide
    - Do not know specific type to use
    - I usually forget
    - I am not comfortable when using PPE
    - Others(specify)_____
20. Have you ever sustained any ocular injury during working?
    - yes
    - No
21. If your answer to question number 20 is yes, what was the trauma
    - Metallic chip FB
    - Blunt trauma
    - Lid laceration
    - Lost vision at workplace trauma
    - Flash of light and foreign body sensation
    - Others(specify)_____
22. If your answer to question number 20 is yes, were you wearing ocular PPE by the time you sustain trauma?
    - Yes
    - No
23. If your answer to question number 20 is yes, what was your role
    - Working by yourself
    - Just bystander
    - Assisting somebody else

D) PPE usage Observation checklist

24. On observation while working, the worker is using PPE
    - Yes
    - No
25. If yes to question number 24, The recommended type is used
    - Yes
    - No
26. If the recommended type is used, the recommended standard is used
    - Yes
    - No

Annex II Consent and questionnaire afaan oromoo version

YUUNIVERSIITII JIMMAATTI INSTITIYUUTII SAAYINSII FAYYAA

KUTAA BARNOOTAA FAYYAA IJAA

Waliigaltee eeyyamamoo ta'uu hojjetaa agarsiisu

Maqaan koo Takkaaliny isheetuu kanan jedhamu yoo ta'u, yeroo ammaa kanatti, Yuuniversiitii Jimmaatti,damee barnootaa ispeeshiyaalayizeeshinii ijaatiin barataa waggaa 4ffaati.qorannoo mata-duree "Assesment of awareness and personal protective eyewear usage in workers of small-scale enterprises in Jimma city" jedhu irratti gaggeessaa kanan jiruu yoo ta'u, eeyyamamoo yoo taatan gaaffiiwwan tokko tokko isin gaafachuun fedha.

Kaayyoon qorannoo kanaa hubannoo fi itti fayyadamiinsi meeshaalee balaa ittisanii kan ijarratti kaawwataman hojjettoota hojii mukaa fi sibiilaa biratti maal akka fakkaatu adda baasuu yoo ta'u, bu'aan qorannoo kanaa qaama ilaallatuuf fi hojjettootaaf ifa ta'uun hojiiwwan balaa iddo hojiitti ijarratti qaqqabuu danda'an bifa irratti hojjetamuu qabuuf kallattii kaa'uuf gargaara.

Adeemsa qorannoo kana keessatti maqaan kee fi deebiin gaaffiiwwan ka'aniif ati laatte namuudhaafuu dabarsmee kan hin ifoomne yoo ta'u adeemsa qorannoo kana keessatti ,hirmaannaan kee fedhii keetiin qofa ta'a.

Eeyyamamoo yoo taate ,itti fufuu?

Tole yoo jedhe gaaffiin itti fufa

Lakkii yoo jedhe hojjetaa isa biraatti ceeta

Maqaa nama gaaffii dhiheessuu fi koodii kennameef_____

Mallattoo_____

Guyyaa_____

Eeyyamamoo ta'uu keetiif galatoomi.

Gaaffiiwwan

A) Qabiyyee hawaasummaa

1. Umurii_____
2. saala
    - dhiira
    - dhalaa
3. haala gaa'ilaa
    - kan fuudhe/heerumte
    - kan hin fuune/heerumne
    - kan hike/hiikte
    - kan abbaan manaa/haati manaa lubbuun hinjirre
    - kan biro_____
4. sadarkaa barnootaa
    - kan hin baranne
    - barnoota bu'uraa qofa
    - sadarkaa 1ffaaa
    - sadarkaa 2ffaa
    - dipiloomaa fi isaa ol
5. gosa interpiraayizichaa
    - hojii sibiilaa
    - hojii mukaa
    - hojii sibiilaa fi mukaa
6. alkoolii ni dhugdaa?
    - Eeyyeen
    - lakkii
7. Gaaffii lakk. 6ffaaf debiin kee eeyeen yoo ta'e, yoom yoomi kan alkoolii dhugdu
    - Sa'atii hojiitiin ala
    - Sa'atii hojiis ta'u
8. Tamboo/sigaaraa ni xuuxxaa?
    - Eeyyeen
    - lakkii
9. caatii ni qamaataa?
    - Eeyyeen
    - lakkii
10. gaaffii lakk. 10ffaa dhaaf deebiin kee eeyyeen yoo ta'e , yoomfaa qamaata?
    - Hojiirras osoon jiruu
    - Sa'aa hojiitiin ala
11. Yeroo hagamii hojii kanarra turtee jirta?
    Waggaa dhaan_____

B) Hubannoo balaawwan iddoo hojiitti ijarra qaqqabuu danda'an fi mala ittisa balaa irratti jiru

12. Waa'ee balaawwan iddoo hojiitti qaqqbuu danda'anii fi maloota ittisa ittisa isaanii irratti leenjii fudhattee jirtaa?
    - Eeyyeen
    - lakkii
    -
13. Balaawwan ijarra qaqabuu danda'an jettee ati yaaddu maal faadha?
    - Sibiila/muka qara qabuun rukutamuu ykn waraanamuu
    - Dhukkeen fi sibiilli ykn mukn xixiqqoon ija keessa galuu bifa dhukkeetiin
    - Cheemikaalli adda addaa ijatti bu'uu
    - Ijji ifa cimaatiin hubamuu
    - Kan biro_____
14. Balaawwan iddoo hojiitti ijarra qaqqabuu danda'an ittisuun ni danda'ama jettee yaaddaa?
    - Eeyyeen
    - lakkii
15. Gaaffii lakk.14ffaaf eeyyeen kan jettu yoo ta'e akkamitti balaa ijarra gahu hambisuun danda'ama?_____

C) Ittifayyadama meeshaalee ijarraa balaa ittisanii

16. Yeroo hojii hojjettu, meeshaa balaa ittisu ni kaawwattaa?
    - Eeyyeen
    - lakkii
17. gaaffii lakk. 16 ffaaf deebiin kee eeyyeen yoo ta'e meeshaalee balaa ijaaittisan hojiikee ammaa kanaaf maal faa dha?
    - Marayaa addaa/eye goggle/
    - Marayaa ifa hir'isu
    - Golgaa mataa fi fuulaa kan yeroo suphaa sibiilaa fayyadaman
    - Golgaa fuulaa kan yeroo suphaa sibiilaa fayyadaman
18. Gaaffii lakk.17ffaaf deebiin kee eeyyeen yoo ta' e, haalli itti fayyadama kee :
    - Yeroo hundaa
    - Yeroo baay'ee
    - Darbee darbee
    - Baay'ee darbee darbee
19. Meeshaalee balaa ijaa ittisan hojiirratti hin fayyadamtu yoo ta'e, maalifi?
    - Fayyadamuun bu'aa hagas mara waan hin qabneef
    - Eessaa akka argamu ykn bitamu waanan hin beekneefi
    - Gatiinsaa olka'aa waanta'eefi bituu waanan hin dandeenyeefi
    - Abba interpiraayizichaa waan naaf hin dhiheessineefi

- Gosa kam hojii kamiif akkan fayyadamuu qabu waanan hin beekneefi
- Yeroo baay'ee waanan hirraanfadhuufi
- Waan hojiirratti natti hin tolleefi
- Kan biro_____

20. Iddoo hojii kanatti balaan ija kee qaqqabee beekaa?
    - Eeyyeen
    - lakkii
21. gaaffii lakk 20ffaaf deebiin kee eeyyeen yoo ta'e balaan sun maal ture?
    - Caccabaa sibiilaatu ijatti nabu'ee beeka
    - Muka yookin sibiilli na rukutee beeka
    - Ifa cimaatu ija koo yeroo baay'ee miidha
    - Kan biro_____
22. Gaaffii lakk 20ffaaf deebiin kee eeyyeen yoo ta'e, balaan ija keerra kan qaqqabe
    - Osoo ofii kee hojjettuuti
    - Namni biraa sibukkeetti osoo hojjetuuti
    - Osoo nama biraa qarqaaraa jirtuuti
23. Gaaffii lakk.20ffaaf deebiin kee eeyyeen yoo ta'e ,yeroo balaan ijaa sirra qaqqabee ture sanitti, meeshaa itisaa kaawwattee turtee?
    - Eeyyeen
    - Lakkii

D) Hojjetaan hojiirra osoo jiruu yemmuu ilaalamu

24. Meeshaa balaa ittisu fayyadamaa jira
    - Eeyyeen
    - Lakkii
25. Yoo hojjetaan meeshaa balaa itisu fayyadamaa jira ta'e, Meeshaan ittisa balaa gosa meeshaan ulaagaa barbaachisu ni guuta
    - Eeyyeen
    - lakkii
26. Gosti meeshaa balaa ittisuu ulaagaa guuta yoo ta'e Sadarkaansaa Kan eege dha
    - Eeyyeen
    - Lakkii

Annex III consent and questionnaire Amharic version

በጅማ ዩኒቨርስቲ ጤና ሳይንስ ኢንስቲትዩት

የዓይን ትምህርት ክፍል

ጤና ይሰጥልኝ፣ ስሜ ተካልኝ እሸቱ ይባላል፣ በጅማ ዩኒቨርሲቲ ዓይን የትምህርት ክፍል የመጨረሻ ዓመት የስፔሻላይዜሽን ተማሪ ነኝ።ባሁኑ ሰዓት "Assessment of Awareness and Personal protective eyewear usage among workers of small-scale enterprises in Jimma City" በሚል ርዕስ ጥናት በማካሄድ ላይ ነኝ። ፈቃደኛ ከሆኑ ዓንዳንድ ጥያቄዎችን ልጠይቆት እፈልጋለዉ።

የዚህ ጥናት ዋና ዓላማ በአነስተኛ የብረትና የእንጨት ሰራ ላይ በተሰማሩ ድርጅቶች ውስጥ የሚሰሩ ሰራተኞች በስራ ጊዜ ኣይናቸዉ ላይ ሊደርሱ ሰለሚችሉ ኣደጋዎችና የመከላከያ መንገዶች ላይ ያላቸውን ግንዛቤ፣ እንደውም በኣሁኑ ጊዜ በስራ ላይ ዓይን ላይ የሚደርሱትን ኣደጋዎች መከላከያ መሳሪያዎች ኣጠቃቀም ምን እንደሚመስል ማጥናት ነው። የጥናቱ ውጤትም ለሚመለከተው አካል ይፋ ከሆነ ቡሃላ፣ በስራ ቦታ ሰለሚያጋጥሙ የዓይን ኣደጋዎችና መካከያ መንገዶች ላይ ግነዛቤ ለማስጨበጥ ይረዳል።

በዚህ ቃለ መጠይቅ ዉሰጥ ስሞት ማይጠቀስና የሚሰጡን ሀሳብ ሀሳብ ሚስጥራዊነቱ የተጠበቀ መሆኑን ሳረጋግጥሎት፣ ሀሳቦትን የሚሰጡን ቃለመጠይቁ ላይ ለመሳተፍ ፍቃደኛ ከሆኑ ብቻ ነው።

መቀጠል እችላለው?

ፍቃደኛ ከሆነ ጥያቄህን ቀጥል

ፍቃደኛ ካልሆነ፣ ወደሚቀጥለው ተሳታፊ ሂድ

የጠያቂው ስም_____

ፊርማ_____

ቃለመጠይቁ የተደረገበት ቀን_____

ሀ) ማህበራዊ-ስነ-ህዝብ ይዘት

1.እድሜ_____

2.ፆታ

- ወንድ
- ሴት

3. የጋብቻ ሁኔታ

- ያገባ/ያገባች
- ያላገባ/ያላገባች
- የፈታ/የፈታች
- ባለቤቱ/ቷ በህይወት የሌለ

4.የትምህርት ደረጃ

- መሰረተ ትምህርት
- 1ኛ ደረጃ
- 2ኛ ደረጃ
- ዲፕሎማና ከዛ በላይ

5.የድርጅቱ ኣይነት

- የ እንጨት ስራ
- የብረት ስራ
- የእንጨትና የ ብረት ስራ

6.ኣልኮል ትጠጣለህ

- ኣዎን እጠጣለዉ
- ኣኣይ እልጠጣም

7. ለጥያቄ ቁጥር 7 መልስህ እዎን ከሆነ መች መች ነዉ ኣልኮል የምትጠጣዉ?

- በስራ ሰዓት

- ከስራ ሰዓት ዉጪ

8. ሲጋራ ታጨሳለህ?

- ኣዎን
- ኣኣይ

9. ጫት ትቅማለህ?

- ኣዎን
- ኣኣይ

10.ለጥያቄ ቁጥር 9 መልስህ ኣዎን ከሆነ፣መች መች ነዉ ምተቅመዉ

- በስራ ሰዓት
- ከስራ ሰዓት ውጪ
- ሁልጊዜ

11.በዚህ ስራ ላይ ምንያህል ዓመት ሰርተሃል

በዓመት_____

ለ) በስራ ላይ ዓይን ላይ ሊደርስ ስለሚችሉ አደጋዎች ሰራተኛዉ ያለዉ ግንዛቤ

12. በስራ ላይ ሊደርሱ በሚችሉ ኣደጋዎችና የመላከያ መነገዶችን በተመለከተ የወሰድከዉ ስልጠና ኣለ?

- ስልጠና ወስጃለው
- ስልጠና ወስጃለው

13.ከስራ ጋር ተያያዠ የሆኑ ሊደርሱ የሚችሉ ኣደጋዎች ጥቀስልኝ

- በብረት ወይም እንጨት ፍንጣሪ መመታት
- እበዋራ
- የኬሚካል ዐይን ላይ መረጨት
- ኣይን በጨረር መጎዳት
- ሌሎች ካሉ_____

14. በስራላይ ኣይን ላይ ሊደርሱ የሚችሉ ኣደጋዎችን መከላከል ይቻላል?

- ኣዎን
- ኣኣይ

15. ለጥያቄ ቁጥር 14 መልስህ ኣዎን ከሆነ፣ እንዴት መከላከል ይቻላል?

_____

ሐ) በስራ ላይ ዓይን ላይ ሊደርስ የሚችል አደጋ መከላከያ መሳርያ የመጠቀም ሁኔታ

16.በስራ ላይ ኣይን ላይ የሚደርሱትን ኣደጋዎች መከላከያ ኣይን ላይ የሚደረጉ ወይም የሚለበሱ መሳሪያዎችን በ ስራ ጊዜ ትጠቀማለህ?

- ኣዎን
- ኣኣይ

17. ለጥያቄ ቁጥር 16 መለስህ ኣዎን ከሆነ ላንተ ስራ,የምትጠቀመዉን መሳሪያ አይነት ጥቀስ

- የአይን ጉግል
- ጨረር የሚቀንስ መነፅር
- የ ጨረር መከላከያ የለዉ ፊት ላይ የሚደረግ መሳሪያ
- ጭንቅላት ላይ የሚደረግ ጨረርና ፍንጣሪዎችን የሚከላከል መሳሪያ

18. ለጥያቄ ቁጥር 16 መልስህ አዎን ከሆነ መን የህል ታዘወትራለህ?

- ሁል ጊዜ ነዉ ምጠቀመዉ
- ብዙ ጊዜ እጠቀማለዉ
- ኣልፎ ኣልፎ ነዉ ምጠቀመዉ
- ኣንዳንዴ ነዉ ምጠቀመዉ

19. ለጥያቄ ቁጥር 16 መልስህ ኣኣይ ከሆን፣ ምክንያትህ ምንድነዉ?

- የአደጋ መከላከያ መሳሪያ ማድረግ ስለማይጠቅም
- ከየት እንደሚገዛ ሰለማላዉቅ
- ለመገዛት ዉድ ስለሆነ
- የድርጅቱ ባለቤት ስላላቀረበልኝ
- ለስራዉ የሚያስፈልገዉን የመከላከያ እይነት ስለማላዉቅ
- ብዙ ጊዜ ስለምረሳ ነዉ
- የአደጋ መከላከያ አድርጌ መስራት ስለማይመቸኝ ነዉ

- ሌላ ካለ_____

20.በስራ ለይ እያለህ ኣይንህ ላይ እደጋ ደርሶ ያዉቃል

- ኣዎ
- ኣኣይ

21ለጥያቄ ቁጥር 20 መልስህ ኣዎ ከሆን የ አይኑ ጉዳትን ምን ነበር

- የብረት ፍንጣሪ
- የእንጨት ፍንጣሪ
- በስራ ቦታ ባሉ እቃዎች መገጨት
- በስለታማ ነገሮች እንደ ድንገት መወጋት
- በጨረር መወጋት
- ሌላ ካለ_____

22. ለጥያቄ ቁጥር 20 መልስህ ኣዎን ከሆን; ገዳት ሲደርስ መከላከያ ተጠቅመህ ነበር

- ኣዎ
- ኣኣይ

23.ጉደት የደረሰብህ አንተ

- ለራስህ ስትሰራ
- ሌላ ሰዉ አጠገብህ ሲሰራ
- አንተ እንዳጋዥ ኣብረህ እየሰራህ

መ) ሰራተኛዉ በስራ ላይ እያለ ሲታይ

24.በስራ ጊዜ ዓይን ላይ ሊደርስየሚችል አደጋ መከላከያ እየተጠቀመነዉ

- እዎን
- ኣኣይ

25.በስራ ጊዜ ዓይን ላይ ሊደርስ አደጋ መከላከያ እየተጠቀመ ከሆነ፣ትክክለኛዉ ኣየወነት ነዉ ትክክለኛዉ ኣየወነት ነዉ

- እዎን
- ኣኣይ

26.ትክክለኛ አይነት ከሆነ፣ ደረጃዉን የጠበቀ ነዉ

- እዎን
- ኣኣይ

Annex IV

UNITED STATES DEPARTEMENT OF LABOR

OCCUPATIONAL SAFTEY AND HEALTH ADMINSTARTION (OSHA)

Recommends

Eye and Face Protection Selection Chart

IMPACT -- Chipping, grinding machining, masonry work, woodworking, sawing, drilling, chiseling, powered fastening, riveting, and sanding	Flying fragments, objects, large chips, particles sand, dirt, etc	Spectacles with side protection, goggles, face shields. See notes (1), (3), (5), (6), (10). For severe exposure, use faceshield.
HEAT -- Furnace operations, pouring, casting, hot dipping, and welding	Hot sparks	Faceshields, goggles, spectacles with side protection. For severe exposure use faceshield. See notes (1), (2), (3).
	Splash from molten metals	Faceshields worn over goggles. See notes (1), (2), (3).
	High temperature exposure	Screen face shields, reflective face shields. See notes (1), (2), (3).
CHEMICALS -- Acid and chemicals handling, degreasing plating	Splash	Goggles, eyecup and cover types. For severe exposure, use face shield. See notes (3), (11).
	Irritating mists	Special-purpose goggles.
DUST -- Woodworking, buffing, general dusty conditions	Nuisance dust	Goggles, eyecup and cover types. See note (8).
LIGHT and/or RADIATION --		
Welding: Electric arc	Optical radiation	Welding helmets or welding shields. Typical shades: 10-14. See notes (9), (12)
Welding: Gas	Optical radiation	Welding goggles or welding face shield. Typical shades: gas welding 4-8, cutting 3-6, brazing 3-4. See note (9)
Cutting, Torch brazing, Torch soldering	Optical radiation	Spectacles or welding face-shield. Typical shades 1.5-3. See notes (3), (9)
Glare	Poor vision	Spectacles with shaded or special-purpose lenses, as suitable. See notes (9), (10).

Notes to Eye and Face Protection Selection Chart:

(1) Care should be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards should be provided. Protective devices do not provide unlimited protection.

(2) Operations involving heat may also involve light radiation. As required by the standard, protection from both hazards must be provided.

(3) Face shields should only be worn over primary eye protection (spectacles or goggles).

(4) As required by the standard, filter lenses must meet the requirements for shade designations in 1910.133(a)(5). Tinted and shaded lenses are not filter lenses unless they are marked or identified as such.

(5) As required by the standard, persons whose vision requires the use of prescription (Rx) lenses must wear either protective devices fitted with prescription (Rx) lenses or protective devices designed to be worn over regular prescription (Rx) eyewear.

(6) Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment. It should be recognized that dusty and/or chemical environments may represent an additional hazard to contact lens wearers.

(7) Caution should be exercised in the use of metal frame protective devices in electrical hazard areas.

(8) Atmospheric conditions and the restricted ventilation of the protector can cause lenses to fog. Frequent cleansing may be necessary.

(9) Welding helmets or **face shields** should be used only over primary eye protection (spectacles or goggles).

(10) Non-side shield spectacles are available for frontal protection only, but are not acceptable eye protection for the sources and operations listed for "impact."

(11) Ventilation should be adequate, but well protected from splash entry. Eye and face protection should be designed and used so that it provides both adequate ventilation and protects the wearer from splash entry.

(12) Protection from light radiation is directly related to filter lens density. See note (4) . Select the darkest shade that allows task performance.

STATEMENT OF DECLARATION OF PRINCIPAL INVESTIGATOR

I the undersigned agree to accept responsibility for the scientific, ethical and technical conduct of the research project and provision of the required progress reports as per terms and conditions of the SRP in effect at time. Grant is forwarded as the result of this application.

Name of the student: Tekalign Eshetu (MD)

Signature ----------Date of submission----------

APPROVALS OF THE ADVISORS

Name of the advisor: ----------

Signature_____

Name of the advisor: ----------

Signature_____