KNOWLEDGE ON FIRST AID OF CHEMICAL EYE INJURIES AND ASSOCIATED FACTORS AMONG CHEMICAL INDUSTRIAL WORKERS IN DAR ES SALAAM.

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By

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A Dissertation Submitted in partial Fulfillment of the Requirements for Degree of Masters of Medicine (Ophthalmology) at

Muhimbili University of Health and Allied Sciences

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CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by Muhimbili University of Health and Allied Science a dissertation entitled: "**Knowledge on first aid of chemical eye injuries and associated factors among chemical industrial workers in Dar es salaam",** in (partial) fulfillment of the requirement for the degree of Master of Medicine (Ophthalmology) of the Muhimbili University of Health and Allied Science.

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DECLARATION AND COPYRIGHT

I, **Dr. John Mpande Charles** declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

Signature..... Date.....

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DEDICATION

This work is dedicated to Jesus, the Son of God; my father, Charles Mpande; my uncle, Joseph Kisandu; my late mother, Saada Sadiki; my children, Lukas, Sarah, Michelle, and Emmanuel; and my best friend, Charles Shanua Sway.

ABSTRACT

BACKGROUND. Chemical eye injury refers to tissue damage that occurs following exposure to chemicals and it is a true ocular emergency. Globally, the incidence ranges from 7.7% to 18%, and in Africa, it is about 3.5% to 8.1%. With industrialization, the incidence among industrial workers is expected to rise. Effective first aid management by industrial workers is crucial, yet their knowledge in this area is generally inadequate, ranging from 14.4% to 69.2% worldwide. Factors affecting this knowledge include first aid training, participation in first aid provision, education level, and years of work experience. In Tanzania, chemical eye injuries are not uncommon, with many patients referred to tertiary hospitals in advanced stages, often leading to complications despite maximum hospital management. Despite this fact, knowledge on first aid and associated factors on chemical eye injury among chemical industrial workers were not well known. Establishing evidence-based strategies to enhance the knowledge on first aid for chemical eye injuries was essential for better first aid management of chemical eye injuries in industrial settings.

AIM: This study assessed knowledge on first aid management of chemical eye injuries and associated factors among chemical industrial workers in Dar es Salaam.

METHODOLOGY: An analytical cross-sectional study was conducted from June to December 2023 in 7 chemical industries located in Dar es Salaam. These industries were from 6 groups of chemical industries, namely, cement, soap and detergent, pesticide, paint, fertilizer, and cosmetics industries. A stratified random sampling method was used in two stages; the first stage involved random selection of industries, and the second stage was random selection of participants from each selected industry. A structured interviewer administered questionnaire was used for data collection, and data were analyzed by SPSS version 27. There were 11 questions on knowledge with scores of 1 and 0 for correct and incorrect responses, respectively. Bloom's cut-off point was used in which those who scored 80-100% were considered to have adequate knowledge while less than that inadequate. The chi-square ($\chi 2$) test and Fisher's exact test were used to check for evidence of association, and logistic regression was used to check for the strength of association between level of knowledge and its associated factors. A P-value

of <0.05 and a 95% confidence interval were considered statistically significant.

RESULTS: A total of 300 participants were recruited in this study, and males were more (68.7%). Most participants had secondary education (39.7%) and were aged between 18 and 30 years (43.7%). The level of knowledge among the study participants was high (81% IQR 63). High level of education (AOR=1.73, 95%CI(1.91-2.11)), being a machine operator or chemist (AOR=1.18,95%CI (1.09-1.26)), training on first aid management (AOR=1.10,95%CI (1.04-1.16)), working in the fertilizer industry, and participation in first aid provision (AOR=1.55,95%CI(1.3-1.82)) were associated with a high level of knowledge on first aid management of chemical eye injury.

CONCLUSION AND RECOMMENDATIONS: The level of knowledge among workers in chemical industries was high. Factors such as receiving information from occupational safety educators, being trained on first aid, participating in first aid provision, witnessing chemical eye injury, and a high level of education were associated with a high level of knowledge on first aid for chemical eye injuries. Upholding and maintaining first aid training for industrial workers is encouraged to enhance knowledge and preparedness for emergency chemical eye injury.

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LIST OF ABBREVIATIONS

IOP	Intra Ocular Pressure
IRB	Institutional Review Board
MMED	Masters of Medicine
MNH	Muhimbili National Hospital
MUHAS	Muhimbili University of Health and Allied Sciences
OSHA	Occupational Safety and Health Authority
USA	United States of America
VA	Visual Acuity
WHO	World Health Organization

DEFINITION OF KEY TERMS

Cataract: Is an opacification of the crystalline lens which may result into impaired vision .

Chemical industries: Refer to industries which incorporate chemicals as their products and/or use chemicals as their intermediate in manufacturing their products.

Blephalospasm: Refers to an abnormal contraction of the eyelid muscles.

Phthisis bulbi: Is a shrunken and non-functional eye.

Lagophthalmos: Is the condition characterized by inability to close the eyelids voluntarily.

Symlephalon: Is a condition where lids become adherent with the eyeball as a result of adhesion between the palpebral and bulbar conjunctiva.

Ectropion: Is an out rolling of the eyelid margin (eyelid margin turns outward).

Entropion: Refers to the condition in which eyelid margin turns inward**.**

1.0 INTRODUCTION

1.1 Background

Chemical eye injury refers to tissue damage to the ocular surface that occur following exposure to chemicals of any form. This is a true eye emergency which can result in pain, discomfort, and years of long-term treatment, poor vision and even blindness, hence requires timely evaluation and appropriate management (1). Responsible chemicals are alkali and acid, where alkaline injuries are more severe and tend to penetrate more rapidly than acidic and cause much more damage to the eye. (2)

Globally, poor occupational health and safety results in 271 million work related injuries (62.6%), 2 million work-related deaths (0.4%) and 160 million work-related diseases (37.0 %) per year (3, 16). In developing countries including Tanzania, the risk of having work-related injury is 6.3% which is 10 times higher than that of developed countries where 35.7% of occupational injuries are due to chemicals (3).

According to Occupational Safety and Health Authority (OSHA) 2011, all the workers in industries should use protective devices, as well be instructed on emergency management in case they are injured. Proper first aid actions taken immediately following chemical eye injury have shown to be effective and results into the good prognosis where water is recommended as an irrigation fluid and copious amount of water has dilution effects (4).

The recommended first aid management to be given by first responder include immediate irrigation with water or normal saline/lactate Ringer if available for at least 15-30minutes with possibly removal of chemical particulates from the eye or use of at least 1 litre of clean water then immediately take the victim to the hospital. This is expected to be known and practiced by the primary responder including chemical industrial workers (5).

Globally the knowledge on first aid of chemical eye injuries is about 14.4% to 69.2% while in developing countries only 33.8% of participants are reported to be knowledgeable on first aid of eye chemical burn. Several factors like participant's age, sex, occupation and level of education are reported to have influence on knowledge of first aid management of chemical eye injuries (6, 7).

Workers in chemical industries, including those in Dar es Salaam, are at risk of chemical eye injuries. Therefore, this study was designed to assess the knowledge on first aid of chemical eye injuries and associated factors among chemical industry workers in Dar es Salaam. The study provided evidence-based information that could be used to develop strategies for first aid management based on the observed findings.

1.2: Problem Statement

Chemical eye injury constitutes an eye emergency and accounts for 11.5% to 22.1% of ophthalmic trauma cases (1, 17). Approximately two-thirds of these injuries occur in working young men. This demographic trend suggests that the economically productive age group is disproportionately affected, potentially leading to long-term impacts on individual lives, families, and the socio-economic development of the country.

In developing countries like Tanzania, the rate of industrialization is concurrent with the incidence of trauma, including chemical eye injuries. It has been observed that the proportion of knowledge on first aid for chemical eye injuries is generally inadequate, ranging between 14.4% to 69.2%. The inadequacy of knowledge results in a significant number of patients being referred to health facilities with little or no first aid management done to them. Our observation at Muhimbili National Hospital (MNH) which is one of tertiary hospital in Dar es salaam, most of chemical industrial workers arrive with little or no first aid given prior which increases risk for complications and poor prognosis of injured eyes.

Ideally immediate after chemical eye injury irrigation with copious water is required before one is taken to hospital, this in most cases is not done in industries. Delay in initiating first aid measures are associated with an increased rate of ocular complications, such as corneal perforation, scarring, and ultimately blindness, due to prolonged exposure to chemical substances (6, 9).

In our context there were limited data or published studies on knowledge on first aid of chemical eye injury among workers in chemical industries. Therefore, this study aimed to assess the level of knowledge regarding first aid management of chemical eye injuries and associated factors among chemical industrial workers in Dar es Salaam.

1.3. Relationship between knowledge on first aid management of chemical eye injuries, associated factors and complications.

Factors such as age, sex, level of education, occupation, first aid training, and any first aid provision participation may have an impact on knowledge on first aid management of chemical eye injury as well as complications that might occur (5, 6, 7).

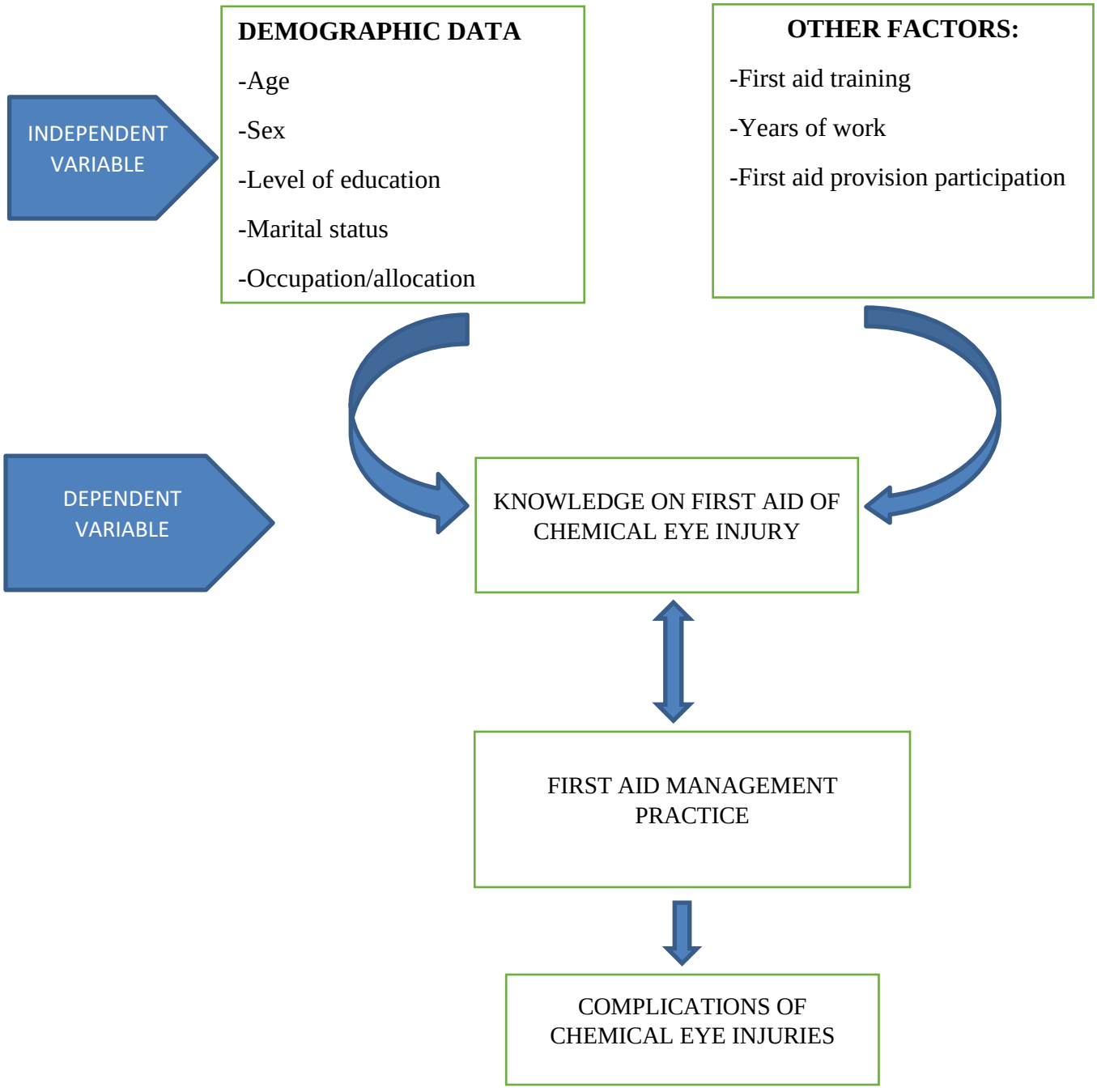


Figure 1: Conceptual Framework of knowledge on first aid of chemical eye injury and associated factors.

1.4: Rationale of the Study

Findings from this study have established a basis for evidence-based strategies on the provision of knowledge to industrial workers regarding first aid for chemical eye injuries. The study findings also established baselines for further studies on chemical eye injuries.

1.5: Research Questions

1. What was the level of knowledge on first aid of chemical eye injuries among industrial workers in Dar es salaam?

2. What were the factors associated with knowledge on first aid of chemical eye injuries among chemical industrial workers in Dar es salaam?

1.6: Objectives of the Study

1.6.1 Broad Objective

To assess the level of knowledge on first aid of chemical eye injuries and associated factors among the industrial workers in chemical industries in Dar es salaam.

1.6.2 Specific Objectives

1. To assess the level of knowledge on first aid of chemical eye injuries among the workers in chemical industries in Dar es salaam.

2. To determine the factors associated with knowledge on first aid of chemical eye injuries among the workers in chemical industries in Dar es Salaam.

1.7 Literature Review

1.7.1 Overview on First Aid of Chemical Eye Injury

The first aid to a victim with a chemical eye injury is a crucial determinant of anatomical and visual outcomes, as well as the patient's overall prognosis (2). Immediate initiation of first aid at the site of the incident by any available person is essential. This involves irrigating the affected eye with copious amounts of water or normal saline and removing contaminated clothing (7).

Prompt treatment of chemically injured workers helps preserve vision, reduce dependency due to blindness, and minimize the consequences of injury and illness before reaching a health facility. Approximately 90% of first aid interventions prevent the progression of the injury. Intensive irrigation immediately after the injury has a decisive influence on the clinical course and prognosis of such eyes (6).

1.7.2 The knowledge on first aid of chemical eye injury

Knowledge of first aid is an important factor towards a better management outcome and a good prognosis following chemical eye injury; thus, putting more emphasis will generally improve eye health among the workers in chemical industry.

Globally, the knowledge on first aid management of chemical eye injuries varies from one place to another. In the study done on Assessing knowledge and practice about eye injuries first aid with awareness about the importance of early management among the general population in Asser Region, Saudi Arabia, by Dhabaan WA et al. in 2020, it showed that the proportion of knowledge on first aid was about 29.5% (6), while in another study by Alqassim AY et al. in 2022, it was estimated to be 32.3% (9). The other study by Alotaibi et al. on Community-Level Awareness of Proper Immediate Steps Regarding Ocular Chemical Injury in Qassim Region, Saudi Arabia, in 2023, found it to be 69%.

Regionally, in Africa, the study done by Gete et al. in Ethiopia showed that only 33.8% of participants were knowledgeable on first aid for eye chemical injuries (5). To the best of my knowledge, there hasn't been a published research on this matter in Tanzania yet.

1.7.3 Factors Associated with Knowledge on First Aid Management of Chemical Eye Injuries among Workers in Chemical Industries

It has been observed that there is variation of knowledge on first aid management toward chemical injury among chemical industrial workers from one place to another and among those in the same location or industry, and the most influential factors on knowledge include age, sex, level of education, occupation/allocation, first aid training, years of practice, and first aid provision participation (5, 6, 7, 9, 15).

Age

Age has been observed to affect or influence one's knowledge; in the study done in the Asser region of Saudi Arabia in 2020, it was shown that respondents with the age group 31-40 had good knowledge compared to other age groups (6). In another study done by Alqassim A.Y. et al. in the Jazan region in 2022, respondents with an age group of 40 years and above had a large proportion of good knowledge (49%), while age groups 18-30 had the lowest proportion of good knowledge (30.2%) among all age groups (9). In Africa, a study done in Ethiopia by Gete et al. in 2021 showed respondents with the age group 33-37 years had a larger proportion of knowledge (42.06%) compared to other age groups (5).

Sex

It has been observed that there is a knowledge difference between male and female in the study done in the Asser region of Saudi Arabia in 2020, which showed that males had a larger proportion of knowledge compared to females, 34.5% against 27.8% (6).

Level of Education

The level of education has been observed to influence the level of knowledge. A study conducted in the Asser region of Saudi Arabia in 2020 showed that individuals with the highest education levels, such as bachelor's and postgraduate degrees, had a high proportion of knowledge (43.2%) compared to those with lower education levels (6). Those with the lowest education levels had the lowest proportion of knowledge (4.8%). Another study by Gemechu et al. in 2018 in Ethiopia indicated that higher education levels were associated with a significantly higher proportion of knowledge (7).

Years of Practice/Work

This refers to the number of years that an individual has been working at or in a particular field. A study done by Gemechu et al. in 2018 in Ethiopia showed that those with at least 3 years of practice/work had a high proportion of knowledge on first aid compared to those with lesser number of years (7).

First Aid Training

First aid and safety training refer to training designed to provide fundamental principles, knowledge, and skills to help victims before they go to the hospital for professional medical treatment. In the study done by Gemechu et al in 2018 in Ethiopia, it was shown that respondents who underwent first aid training had a relatively higher proportion of knowledge compared to those who were never trained (7).

First Aid Provision Participation

Participation in first aid provision give an experience to an individual and influence someone's knowledge on first aid provision. In a study done by Gemechu et al in 2018 in Ethiopia it was observed that the respondents with previous participation in first aid provision had a higher knowledge proportion compared to those with no history of first aid provision (7).

CHAPTER TWO

2.0 METHODOLOGY

2.1: Study Design

An analytical cross-sectional study was carried out to evaluate the level of knowledge and associated factor on first aid of chemical eye injuries among workers from chemical industries in Dar es Salaam.

2.2: Study period

The study was conducted from June to December 2023

2.3: Study Area

The study was conducted in chemical industries within Dar es Salaam, which is the most industrialized city in Tanzania having an approximate population of 5.3 million according to the 2022 census. The city is estimated to have 41 registered chemical industries that are located at different places in its 5 districts, which are Ilala, Kigamboni, Temeke, Ubungo and Kinondoni. The industries differ in terms of the chemicals involved and the number of workers, which range from 60 to 500. The chemical industries involved in this study include the cement, detergent, pesticide, paint, fertilizer, and cosmetics industries. Thus, data was collected from 7 stratified randomly sampled chemical industries from Dar es Salaam.

2.4: Study Population

All workers from chemical industries in Dar es Salaam.

2.5: Inclusion Criteria

Any person who was working at the selected chemical industries.

2.6: Exclusion Criteria

Workers who were not available at their workplace during the entire data collection period due to various reasons such as study leave.

2.7: Sampling Technique

A stratified random sampling method was used in two stages, the first was to randomly select industries from 41 chemical industries present in Dar es salaam, whereby the 41 chemical industries were divided according to the product they are producing namely Soap and detergent industries (16), cement industries (8), paint and coating industries (4), cosmetics industries (6), pesticides industries (4) and Fertilizer (3). Then industries were selected according to proportion of number of industries in each group. In each group the industries were given number then an online random number generator was used to get the numbers in which the corresponding industries were selected. Two industries were selected from soap and detergent group while one industry was randomly selected from the other five groups to make a total of 7 industries.

The second stage was to randomly select participants from workers in the 7 selected industries, a population of 1492 participants was found in 7 industries in which soap and detergent had 653(363 and 320), cement industries had 360, Paint industry had 134, cosmetic industry had 128, fertilizer industry had 112 and Pesticide industry had 78 workers. From each industry the sample was drawn randomly according to its proportion in the study population in which soap and detergent, cement, Paint, Cosmetic, Fertilizer and pesticide gave 136(72 and 64),72,27,26,23 and 16 study participants respectively.

Example 72 participants from cement industry found as follows

300x 360/1492=72

Given that 300 is the sample size, 360 number of workers at selected cement industry and 1492 is the study population.

A numbered list of eligible workers from each of the seven selected industries was asked for by the Principal Investigator to participate in the study. Using online Random number generator, the random numbers of participants to be involved in the study were generated and matched to those in the list, then the corresponding worker on list was recruited to participate in the study.

Table 1: Distribution of study participants and their recruitment in the study.

Group of Industry	Name of the industry	Location	Number of workers	Number of participants
Soap and detergent	Royal soap and Detergent industry	Ubungo	320	64
Soap and detergent	Wirmar soap and detergent Tanzania LTD	Ilala	363	72
Cement Industry	Tanzania Portland cement LTD	Kinondoni	360	72
Paint Industry	Goldstar Paints Tanzania LTD	Temeke	134	27
Cosmetic Industry	Chemicortex industry LTD	Kinondoni	128	26
Fertilizer Industry	Premium Agrochemical LTD	Ilala	112	23
Pesticide Industry	Farmbase Industry LTD.	Ilala	78	16

2.8: Sample Size Estimation

The sample size estimation was done using the formula below;

$$n = \frac{z2\ p\ (100 - p)}{e2}$$

Where

n=estimated minimum sample size

Z=confidence level at 95% (Standard value of 1.96)

P= Proportion of respondent with good knowledge (14.4%) According to the study done in southern Ethiopia (1)

d=margin error at 4% (standard value of 0.04)

The sample size calculation,

$$n = \frac{(1.96 \times 1.96)\ X\ 0.144(1 - 0.144)}{0.04 square}$$

n =295

Minimum sample size =295.

In this study a sample size of 300 chemical industrial workers were used.

2.9 Research Variables.

2.9.1 Dependent Variables

Knowledge on First Aid management of chemical eye injuries among workers in chemical industries in Dar es salaam

2.9.2 Independent Variables

Age, Sex. Marital status, Level of education, Occupation, First aid training, any first aid provision participation and Years of work.

2.10: Data Collection Methods

A constructed structured interviewer administered questionnaire was used for data collection.

The questionnaire was divided into the following 3 sections,

Section A. Socio-demographic section which included Age, Sex. Marital status, Level of education and Occupation.

Section B. Assessment of knowledge on first aid management of chemical eye injuries.

Section C. Assessment of factors associated with knowledge on first aid management of chemical eye injuries.

The questions of the questionnaire were adopted with modifications to suit the study setting and were from 3 studies:

- One to assess knowledge and practice about eye injuries first aid with awareness about the importance of early management among the general population in Asser Region (6).
- Another to assess knowledge, attitude, and practices of emergency management of ocular chemical injury among primary responders in Northern Karnataka, India (12).
- A study on Population level investigation of knowledge of ocular injuries and proper immediate action (2).

The questionnaire was developed in English and Swahili version and Data collection was done by the researcher.

2.11: Data Collection Procedure.

Data collection began with obtaining permission to conduct the study from the industrial authority. Introduction and familiarization at each of the seven selected industries from six industrial groups were done by the principal investigator with the help of industry authorities. A list of eligible workers from each of the seven selected industries was asked for by the principal investigator then participants were randomly selected from the list according to match with the random number from the online random number generator.

A list of participants to be involved in the study was presented to the industrial authority, and the plan to interview the participants was made, including the day, time, and the specific participants who will be interviewed on that particular day at that particular industry. This was done by the industrial authority for easy access to the participants.

It took at least 1 week and a maximum of 3 weeks to complete interviewing the participants at one industry, depending on the number of participants recruited and compliance of the authority to allow their workers to participate in the study.

The workers who met the inclusion criteria and agreed to participate in the study were given a written consent form to sign, which was also signed by the principal investigator, after being informed about the study's purpose, confidentiality, risks, and benefits.

Each participant was interviewed separately using an interviewer-administered questionnaire.

2.12: Data management and statistical analysis.

The data were entered, cleaned , and analyzed using SPSS Statistics version 27 software.
The major variables were knowledge and their respective associated factors on first aid management of chemical eye injuries. In measuring these variables, the study utilized knowledge-related questions and questions on associated factors.
There were 11 questions for knowledge; each question had an item score of "1" for the correct response and "0" for the incorrect response. Subsequently, scores were added, and the median score was calculated.

A modified Bloom's cut-off point was employed, wherein respondents who scored 80–100% were considered to have adequate knowledge; those who scored less than 80% were considered to have inadequate knowledge.

Descriptive statistics were analyzed wherein continuous variables were reported using median, and categorical variables were presented using tables, graphs, or charts. The chi-square ($\chi 2$) test and Fisher's exact test were used to check for statistical significance of the association between the dependent variable and independent variables. Univariate and multivariate analyses were conducted to determine the strength of association between the dependent and independent variables. In both univariate and multivariate analyses, logistic regression was used to test the association between the variables. Variables with a P-value of less than 0.2 in univariate regression were analyzed in multivariate regression to control for confounders. A P-value <0.05 was considered statistically significant, and the confidence interval was 95%.

2.13: Ethical Clearance and Consideration.

The Institutional Review Board at MUHAS granted the study ethical approval before it could begin. Subsequently, the ethical clearance letter was attached with an introductory letter from the head of the Ophthalmology department and taken to the selected industries to request permission to collect data. Permission to conduct the study was sought from the industrial management of each selected chemical industry. To ensure confidentiality, anonymity, honesty, and fair treatment, the names of patients were not included in the questionnaire. Participants were informed that participation in the study was on a voluntary basis and that refusal to participate would not compromise their work or job. No risk for participation was ensured and benefits of participating in the study were elaborated.

CHAPTER THREE

3.0 RESULTS

This study involved a total of 300 participants

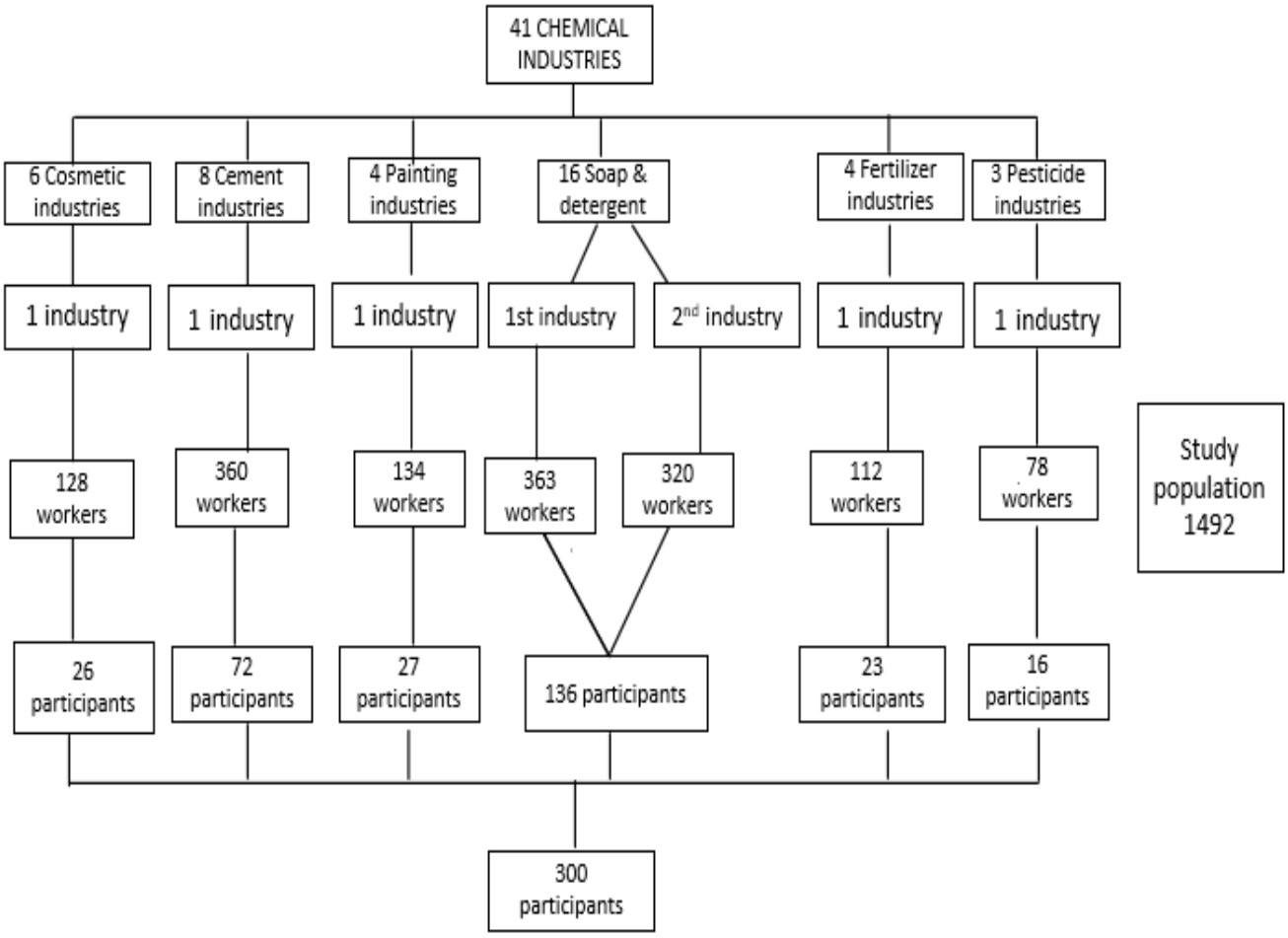


Figure 2: Flow chart showing recruitment of study participants

Table 2: Socio-demographic characteristics of the study participants (N=300)

Characteristic	Frequency	
	n	%
Age (years)		
18-30	131	**43.7**
31-40	105	35.0
>40	64	21.3
Median (33) IQR-28		
Sex		
Male	206	**68.7**
Female	94	31.3
Marital Status		
Married	164	**54.7**
Single	133	44.3
Separated/Divorced	3	1.0
Level of education		
Primary level	99	33.0
Secondary level	119	**39.7**
Certificate/ Diploma	34	11.3
Degree/Postgraduate	48	16.0
Occupational status		
Machine operator	74	**24.7**
Chemical/Scientist	33	11.0
Carrier of industrial staff	45	15.0
Administrative	46	15.3
Others*	102	**34.0**

Key: Other occupation include Fire fighter, cleaners, Security guards, Packers,

Among 300 participants, the majority fell within the age range of 18–30 years, comprising 43.7%. The median age was 33 with an interquartile range of 28. Majority were males, accounting for 68.7% of the total. About a half (54.7%) of the participants were married. The larger proportion of participants (39.7%) had a secondary level of education. Regarding occupational status, the largest group were engaged in other activities within the industry (34.0%), followed by machine operators (24.7%). (Table 2)

Table 3: Background information of the study participants (N=300)

Factor	Frequency	
	n	%
History of chemical injury		
Yes	88	**29.3**
No	212	70
Witnessed chemical eye injury		
Yes	129	**43.0**
No	171	57.0
Years of work at industry		
< 1 year	40	13.3
1 to 3 years	104	34.7
4 to 5 years	43	14.3
>5 years	113	**37.7**
Source of information on First aid management		
Family and friends	46	15.3
Radio TV	23	7.7
Magazine	8	2.7
Occupational safety educators	215	**71.7**
During studies/school	8	2.7
Attendances to any First aid training		
Yes	71	**23.7**
No	229	76.3
Participated to First aid provision to a victim		
Yes	90	30.0
No	210	**70.0**
Have you ever witnessed chemical eye injury?		
Yes	129	**43.0**
No	171	57.0
Type of injury		
Soap and detergent industry	136	**45.3**
Cement industry	72	24.0
Paint and coating industry	27	9.0
Cosmetic industry	26	8.7
Fertilizer industry	24	8.0
Pesticide industry	15	5.0

The results showed that one-third (29.3%) of participants had a history of chemical eye injury, while almost a half (43.0%) had witnessed such injuries. Concerning years of work experience in the industry, one-third (34.7%) had 1 to 3 years, and another third (37.7%) had over 5 years of experience. The majority of the participants had occupational safety educators as the primary source of information on first aid management (71.7%). Furthermore, only 23.7% of participants had attended any first aid training. Most of the participants were from the soap and detergent industries (45.3%). (Table 3)

Table 4: Distribution of participants according to response on knowledge questions (N=300)

	Frequency	
	N	**%**
Ever heard of first aid management of chemical injury		
Yes	300	**100**
No	0	0
Which is more dangerous to the eye than the other		
Alkali	40	13.3
Acid	192	**64.0**
Both are equally dangerous	2	0.7
Don't know	66	22.0
First action to be taken when you or co-worker has chemical eye injury		
Take him/her immediately to hospital	38	12.7
Cover the affected eye	24	8.0
Wash with plenty of water	221	**73.7**
Provide an eyedrop from a pharmacy	10	3.3
Don't know	7	2.3
Is it necessary to locate and remove the chemical particles from the eye in chemical eye injuries?		
Yes	184	61.3
No	65	21.7
Don't know	51	17.0
What type of chemicals frequently cause eye injury?		
Acid	184	52.0
Alkali	65	21.7
Both	1	0.3
Don't know	78	26.0
What is the most urgent sign of chemical eye injury?		
Whitening of the eye	13	4.3
Redness of the eye	225	75.0
Don't know	62	20.7
What is the minimum amount of water used		
0.25L	2	9.0
0.5L	17	7.4
1L	125	**54.1**
Don't know	87	37.7
What is the minimum duration used irrigation		
5min	98	42.4
15min	45	**19.5**
30min	26	11.3
Don't know	62	26.8

All participants were aware of first aid for chemical eye injuries; the majority (64%) of the participants reported acid to be more dangerous than alkali to the eye; most of the participants (73.7%) said washing with plenty of water is the first action for a victim of chemical eye injury; and about one-third (37%) did not know the amount of water appropriate for irrigation. (Table 4)

Majority of the participants had adequate knowledge (70.1%).

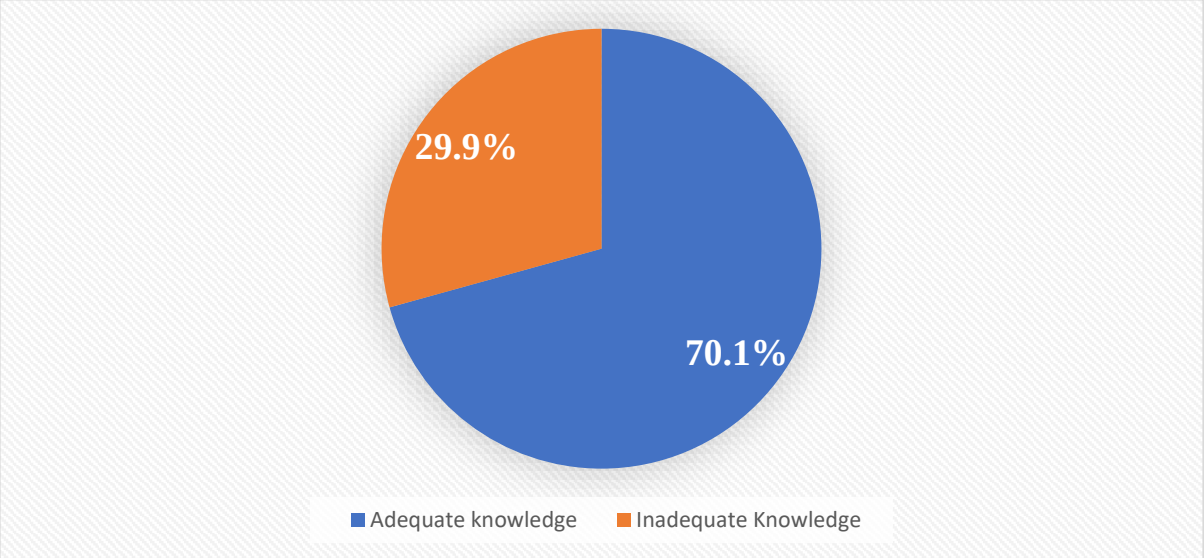


Figure 3: Distribution of participants according to knowledge proportion (N= 300)

The median level of knowledge on first aid of chemical eye injuries was found to be 81% inter-quartile range of 63.

Table 5: Relationship between Socio-demographic characteristics and the level of knowledge (N=300)

Characteristic	Knowledge status		P- value
	Adequate	Inadequate	
	n(%)	n(%)	
Age (years)			
18-30	91(69.5)	40(30.5)	
31-40	**77(73.3)**	**28(26.7)**	**0.754**
>40	44(68.8)	20(31.2)	
Sex			
Male	**150(72.8)**	**56(27.2)**	0.226
Female	62(66.0)	32(34.0)	
Marital Status			
Married	116(70.7)	48(29.3)	0.988
Single	94(70.7)	39(29.3)	
Separated/Divorced	1(33.3)	2(66.7)	
Level of education			
Primary level	68(68.7)	31(31.3)	
Secondary level	79(66.4)	40(33.6)	**0.043**
Certificate/ Diploma	26(76.5)	8(23.5)	
Degree/Masters	**39(81.2)**	**9(18.8)**	
Occupational status			
Machine operator	65(87.8)	9(12.2)	
Chemical/Scientist	**29(88.9)**	**4(11.1)**	**<0.001**
Carrier of industrial staff	24(53.3)	21(46.7)	
Administrative	33(71.7)	13(28.3)	
Others	61(59.8)	41(40.2)	

Key: Other occupation include Fire fighter, cleaners, Security guards, Packers,

A large proportion of participants in the group of Degree/Postgraduate had adequate knowledge, and the difference was statistically significant as the P-value was 0.043. Majority 89.9% participants in a group of scientist and chemists had adequate knowledge and the difference was statistically significant (P-value <0.001). (Table 5)

Table 6: Relationship between other factors and the level of knowledge (N=300)

Characteristic	Knowledge status		P-value
	Adequate n (%)	Inadequate n (%)	
History of chemical eye injury			
Yes	**67(76.1)**	**21(23.9)**	0.375
No	153(72.2)	59(27.8)	
Witnessed chemical eye injury			
Yes	**96(74.4)**	**33(25.6)**	0.215
No	116(67.8)	55(32.2)	
Years of work at industry			
< 1 year	27(67.5)	13(32.5)	
1 to 3 years	68(65.4)	36(34.6)	0.377
>3 to 5 years	33(76.7)	10(23.3)	
>5 years	**84(74.3)**	**29(25.7)**	
Source of information on First aid management			
Family and friends	27(58.7)	19(41.3)	
Radio TV	14(60.9)	9(39.1)	
Magazine	4(50.0)	4(50.0)	**0.035**
Occupational safety educators	**159(74.0)**	**56(26.0)**	
School	8(100.0)	0(0.)	
Attendances to any first aid training			
Yes	**62(87.3)**	**9(12.7)**	**<0.001**
No	150(65.5)	79(34.5)	
Participated to first aid provision to a victim			
Yes	**75(83.3)**	**15(16.7)**	**0.002**
No	137(65.2)	73(34.8)	
Type of Industry			
Soap and detergent industry	97(71.3)	39(28.7)	
Cement industry	46(63.9)	26(36.1)	
Paint and coating industry	21(77.8)	6(22.2)	
Cosmetic industry	17(65.4)	9(34.6)	0.474
Fertilizer industry	**20(83.3)**	**3(16.7)**	
Pesticide industry	11(73.3)	4(26.7)	

A significant proportion (74.0%) of individuals who received information on first aid from Occupational Safety Educators demonstrated adequate knowledge, with a statistically significant difference observed (P-value = 0.035). The majority of those who had attended first aid training (87.3%) had adequate knowledge, and the difference was statistically significant as the P-value was <0.001. A significant proportion of those with a history of participation in first aid provision (83.3%) had adequate knowledge, and the observed difference was statistically significant (P-value = 0.002). Large proportion of participants from the fertilizer industry (83.3%), had adequate knowledge, however the difference was not statistically significant (P-value=0.474). (Table 6)

Table 7: Univariate and multivariate analysis of the factors associated with level of Knowledge on first aid of chemical eye injury (N=300)

	Univariate analysis		Multivariate analysis	
Factors	**COR (95% CI)**	**P-value**	**AOR (95% CI)**	**P-value**
Age (years)				
18-30	1.03 (0.54-1.97)	0.919	-	
31-40	1.25 (0.63-2.48)	0.522		
>40	Ref			
Sex				
Male	1.38 (0.82-2.34)	0.227	-	
Female	Ref			
Marital Status				
Married	1.2 (0.11-13.6)	0.878	-	
Single	1.2 (0.11-13.7)	0.880		
Separated/Divorced	Ref			
Level of education				
Primary level	Ref			
Secondary level	0.51 (0.22-1.17)	0.112	0.97(0.88-1.06)	0.508
Certificate/ Diploma	0.46 (0.20-1.03)	0.060	0.96(0.88-1.05)	0.402
Degree/Masters	**1.75 (1.27-2.19)**	**0.043**	**1.73(1.91-2.11)**	**0.046**
Occupational status				
Machine operator	4.85 (2.18-10.82)	**<0.001**	1.18(1.09-1.26)	**<0.001**
Chemist/Scientist	**4.87 (1.59-14.90)**	**0.005**	**1.15(1.04-1.27)**	**0.005**
Carrier of industrial staff	0.77 (0.38-1.56)	0.465	0.96(0.86-1.08)	0.519
Administrative	1.71 (0.80-3.63)	**0.165**	1.06(0.97-1.17)	0.209
Others	Ref			
History of chemical injury				
Yes	1.17 (1.66-1.78)	**<0.001**	1.49(0.82-2.72)	0.187
No	Ref			
Witnessed chemical eye injury				
Yes	1.67(1.61-1.75)	**<0.001**	1.04(0.98-1.10)	0.209
No	Ref			
Years of work at industry				
< 1 year				
1 to 3 years	0.96(0.87-1.06)	0.425	0.99(0.89-1.10)	0.935
4 to 5 years	0.95(0.88-1.02)	**0.152**	1.01(0.94-1.09)	0.795
>5 years	1.01(0.93-1.10)	0.752	1.05(0.96-1.14)	0.277
Source of information on First aid management				
Family and friends	Ref			
Radio TV	0.79(0.73-0.86)	**<0.001**	0.83(0.75-0.93)	**0.001**
Magazine	0.80(0.71-0.91)	**<0.001**	0.83(0.72-0.96)	**0.015**
Occupational safety educators	0.75(0.59-0.95)	**0.015**	0.78(0.64-0.95)	**0.012**
School	0.87(0.84-0.90)	**<0.001**	0.88(0.81-0.95)	**0.002**
Attendances to any First aid training				
Yes	1.13(1.07-1.19)	**<0.001**	1.10(1.04-1.16)	**0.001**
No	Ref			

Participated to First aid provision to a victim				
Yes	1.11(1.05-1.17)	**<0.001**	1.05(1.3-1.82)	**0.048**
No	Ref			
Type of injury				
Soap and detergent industry	0.98(0.86-1.13)	0.867		
Cement industry	0.95(0.817-1.09)	0.451		
Paint and coating industry	1.03(0.88-1.19)	0.751		
Cosmetic industry	0.95(0.81-1.13)	0.588	-	
Fertilizer industry	1.06(0.91-1.23)	0.471		
Pesticide industry	Ref			

Key: CoR: Crude Odds Ratio, AoR: Adjusted Odds ratio

Level of education showed a positive association with level of knowledge, such that the odds of having a high level of knowledge were 1.73 among those with masters/degrees compared to those with primary education level. Working as machine operator and chemist/scientist had a positive association with level of knowledge, with odds of 1.18 and 1.15 among machine operator and chemist/scientist, respectively, compared with those in other occupations. First aid training and participation in first aid provision to a victim had a positive association with level of knowledge compared to those who did not. (Table 7)

CHAPTER FOUR

4.0 DISCUSSION

Knowledge on first aid of chemical eye injuries among chemical industrial workers is crucial. It aids in reducing morbidity and complications and improves the visual prognosis for victims.

In this study, the majority of participants were males (68.7%); this is contrary to other studies in which females were more than male participants. In the Saudi Arabia study done by Dhaaban et al. and Alqassim et al., females accounted for 85.7% and 51.1%, respectively. In another study done in Ethiopia by Gete et al., females accounted for 60.7% of the participants (5, 6, 9). This difference may be attributed to a difference in study population, as in this study participants were from chemical industries, and males were the majority of the employees as compared to females, which justified the higher proportion of males, while the other studies took participants from the general population.

The overall level of knowledge observed in our study was higher (81%) compared to that reported in Saudi Arabia by Alotaibi S.A. et al. and Alqassim et al., where the average knowledge scores were 69% and 48.1%, respectively (9, 14). The observed differences could be attributed to variations in the studied populations. The present study included participants from chemical industries, where first aid training is regularly provided and the presence of safety officers and mandatory protective equipment is enforced. Additionally, OSHA officers regularly visit these areas. In contrast, other studies involved participants from the general population where no training was provided.

This study found that there was no association between knowledge and age of the participants (P-value = 0.754); however, there was an observed high proportion of adequate knowledge in middle aged group (31-40). A similar finding was observed in Saudi Arabia by Dhabaan et al. (6). This shows that age category is not an important factor in relation to level of knowledge; hence, it highlights the importance of the involvement of workers in on-the-job training and first aid training regardless of their age.

It was found that there was no association between knowledge and sex of the participants (P-value 0.227), though the proportion of males with adequate knowledge (72.8%) was slightly higher than of females. The finding was similar to that reported in Saudi Arabia by Dhabaan et al. (6). This could be due to the fact that even though males are the majority employees in these chemical industries, the health education regarding first aid measures and safety is equally given to all workers irrespective of their sex. This study underscores the importance of providing equal opportunities for both males and females.

In the present study, there was a significant association between level of education and knowledge status ($p = 0.043$). Participants with a certificate/diploma or degree/masters had higher proportions of adequate knowledge compared to those with primary or secondary education. Similar findings were reported in studies done by Bamahfouz et al., Dhabaan et al., and Alqassim et al. (6, 9, 15). The similarity observed here can be attributed to the notion that as one's level of education advances, their capacity for critical thinking, comprehension, and understanding tends to increase. Additionally, exposure to health-related concepts and first aid knowledge tends to expand accordingly. This signifies the importance of considering level of education when recruiting employees in chemical industries, as it has been shown to have an influence on knowledge on first aid for chemical injuries.

Occupational status showed a significant association with knowledge ($p < 0.001$). Machine operators and chemists/scientists showed higher proportions of adequate knowledge compared to carriers of industrial stuff, administrative workers, and others.

This finding could be attributed to the training received by machine operators, chemists, and scientists, both during their formal education and on-the-job experience. Their training equips them with the necessary knowledge and skills to handle chemicals and equipment safely, as well as administer first aid in the event of an injury.

This study found that there was an association between knowledge and first aid training, as participants who attended any first aid training demonstrated higher levels of adequate knowledge (87.3%) compared to those who did not ($p < 0.001$). This finding was higher compared to that reported in Ethiopia by Ganfure G. et al., which was 66.1% (7).

The difference might be attributed to the difference in study populations; the present study focused on chemical industrial workers who directly have contact with chemicals during their daily work. Also, chemical industrial workers receive mandatory training on first aid, which makes them more knowledgeable on first aid for chemical eye injuries. We advocate occupation-specific first aid training programs on chemical eye injury with regular refreshers and assessments. As well advocate for policies mandating such training in high-risk industries to ensure comprehensive knowledge and preparedness of workers in case of emergency.

This study found that those who participated in first aid provision to a victim showed a significantly higher proportion of adequate knowledge (83.3%) compared to those who did not participate ($p = 0.002$). This can be explained by the fact that improvement in knowledge occurs when someone engages in practice.

This study found no association between level of knowledge and the number of years a worker has worked in the industry, although there was an observable increase in the proportion of adequate knowledge among participants with an increase in years of work in the industry ($p = 0.377$), with a large proportion in those who worked >5 years (74.3%). This finding was higher compared to that reported in Ethiopia by Ganfure G et al. (58.6%) (7). The difference could be attributed to differences in the study population. Employees in chemical industries undergo regular first aid training and are more likely to encounter incidents requiring first aid provision, hence more knowledge. Also, absence of association highlights the importance of equal opportunity and access to training and first aid provision regardless of the number of years someone worked in the industry.

In this study, it was also found that working in the fertilizer industry was associated with an increased proportion of adequate knowledge among participants (83.3%); however, the difference in proportion of adequate knowledge among industrial groups was not statistically significant. This highlights the importance of equal access and opportunity to first aid training among workers in different chemical industries as it is advocated by OSHA and safety regulations because this is a cornerstone for occupational safety and preparedness for emergencies.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The level of knowledge on first aid of chemical eye injuries among workers in chemical industries was found to be high. It was observed that factors such as receiving information from occupational safety educators, being trained on first aid, participating in first aid provision, witness of chemical eye injury and high level of education are associated with high level of knowledge on first aid of chemical eye injury.

5.2 Recommendations

We recommend upholding and maintenance of education and occupational and first aid training to enhance knowledge and preparedness for emergency situations.
We advocate a study to assess how this knowledge on first aid of chemical eye injuries can be translated into practice.

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APPENDECES

Appendix 1: Consent Form

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCE

SCHOOL OF MEDICINE

OPHTHALMOLOGY DEPARTMENT

RESEARCH ON KNOWLEDGE ON FIRST AID OF CHEMICAL EYE INJURIES AND ASSOCIATED FACTORS AMONG CHEMICAL INDUSTRIAL WORKERS IN DAR ES SALAAM.

CONSENT FORM: Greetings. I am JOHN MPANDE CHARLES an Mmed student from MUHAS conducting research to assess knowledge on First aid of chemical eye injuries and associated factors among chemical industrial workers in Dar es salaam.

PURPOSE OF THE STUDY: This study will help to determine the knowledge on first aid of chemical eye injuries and associated factors among industrial workers from chemical industries in Dar es salaam.

The participants are kindly asked to participate in this study to facilitate achievement of the objectives. Honest and truth of the participants will give the better results that will lead to provision of good recommendation. Moreover, the participation in this study is voluntary therefore if participants agree to participate in this study, he/she will be interviewed with few questions which are already prepared.

CONFIDENTIALITY: All the information will be collected on well-structured questionnaire and then entered into the computer with only the study identification number, names will not appear anywhere in the research. The data will be kept and observed by only authorized personnel and any unauthorized individual will not be allowed to access it.

RISK: I do not expect any harm to happen because of participation in this study.

BENEFIT OF THE STUDY: The results of this research will help to improve the knowledge and practices on first aid of chemical eye injury among industrial workers and to check for the associated factors.

RIGHT TO WITHDRAW: The participant may stop the interview at any time even if have already given consent. Refusal to participate or withdraw from the study will not involve any penalty.

CONTACTS: For any questions or further information you can communicate with me or my supervisor

My phone numbers

0753351109

Email: johnmpande72@gmail.com

Supervisor:

0764156819/ 0689527952

Dr Suzan

Ophthalmology Specialist @ MUHIMBILI NATIONAL HOSPITAL

Appendix II: Informed Consent (Swahili Version)

CHUO KIKUU CHA AFYA NA SAYANSI SHIRIKISHI MUHIMBILI

KITIVO CHA UTABIBU

IDARA YA MACHO

UTAFITI JUU YA MAARIFA KUHUSU UTOAJI HUDUMA YA KWANZA KWA MTU ALIEMWAGIKIWA KEMIKALI MACHONI NA SABABU ZINAZOATHIRI MAARIFA HAYO MIONGONI MWA WAFANYAKAZI WA VIWANDA VYA KEMIKALI DAR ES SALAAM.

KURUGENZI YA TAFITI NA MACHAPISHO

Namba ya utambulisho…….

KIBALI CHA KUSHIRIKI KWENYE UTAFITI

Ngugu,

Salaam, Mimi ni Dkt. John Mpande Charles mwanafunzi wa shahada ya uzamili katika idara ya macho, Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili. Ninafanya utafiti kuangalia maarifa kuhusu utoaji wa huduma ya kwanza kwa mtu aliemwagikiwa kemikali machoni na sababu zinzo athiri maarifa hayo miongoni mwa wafanyakazi wa viwanda vya kemikali Dar es salaam.

Lengo la utafiti huu ni kutambua maarifa kuhusu utoaji wa huduma ya kwanza kwa mtu aliemwagikiwa kemikali machoni na sababu zinzo athiri maarifa hayo miongoni mwa wafanyakazi wa viwanda vya kemikali Dar es salaam .

Usiri: Taarifa zote zitakazotolewa na mshiriki zitakua siri na hazitatumika kwanamna yoyote nyingine tofauti na utafiti.

Faida: Matokeo ya utafiti huu yataonesha kiwango cha maarifa kuhusu utoaji wa huduma ya kwanza kwa mtu aliemwagikiwa kemikali machoni na kuweka bayana sababu zinazo athiri maarifa hayo miongoni mwa wafanyakazi wa viwanda vya kemikali Dar es salaam .

Madhara: hakuna madhara yoyote yanayotarajiwa kutokana na utafiti huu.

Uhuru wa Ushiriki

Ushiriki katika utafiti huu ni wa hiari. Mshiriki yeyote ana haki ya kuamua kujitoa katika utafiti wakati wowote. Kukataa kushiriki katika utafiti huu hakutaathiri utenaji kazini au ajira ya mshiriki.

Ikiwa una maoni yoyote wasiliana na mimi moja kwa moja au yeyote kati ya wafuatao

Ukiwa na maswali juu ya utafiti huu wasiliana na mtafiti mkuu, Dkt. John Mpande Charles, Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili, S.L.P 65001, Dar es Salaam. Simu 0753351109. Endapo ikitokea una maswali juu ya haki zako za ushiriki katika utafiti huu unaweza kuwasiliana na Dkt. Bruno Sunguya, Mkurugenzi wa tafiti na mashapisho, S.L.P 65001 Dar es Salaam. Simu +255 022 215 2489, Dkt. Suzan Mosenene (0764 156 819) amabao ni wasimamizi katika utafiti huu..

Kiapo

Mimi ……nimesoma na kuelewa yaliyoandikwa kwenye fomu hii. Maswali niliyokuwanayo yamejibiwa na niko tayari kushiriki katika utafiti huu.

Sahihi ya mshiriki……..Tarehe……

Sahihi ya mtafiti…….Tarehe……...

Appendix III: English Version Questionnaire

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCE

SCHOOL OF MEDICINE

OPHTHALMOLOGY DEPARTMENT

RESEARCH QUESTIONNAIRE TO ASSES KNOWLEDGE ON FIRST AID OF CHEMICAL EYE INJURIES AND ASSOCIATED FACTORS AMONG CHEMICAL INDUSTRIAL WORKERS IN DAR ES SALAAM.

Questionnaire no ……

Date ……

Name of the industry…….

SECTION A:

SOCIO-DEMOGRAPHIC CHARACTERISTICS**:**

1 Age of the respondent

<18

18-30

31-40

>40

2. Sex

(a) Male

(b) Female

3. What is your marital status?

(a) Married

(b) Not married

(c) Cohabiting

(d) Widow/widower

(e) Divorced/separated

4. Level of education

(a) none

(b) Primary school

(c) Secondary school

(d) College

(e) University

5. Type of work/occupation within the industry

(a)Machine operator

(b)Chemist/scientist

(c)Carrier of industrial stuffs

(d)Administrative

(e)Other……

6. Have you ever had history of chemical eye injury?

(a) YES

(b) NO

7.Have you ever witnessed chemical eye injury

(a) Yes

(b) No

SECTION B:

TO DETERMINE THE KNOWLEDGE ON FIRST AID OF CHEMICAL EYE INJURIES.

1. What type of chemical which frequently cause eye injury?
   (a)Acid
   (b)Alkali
   (c) Don't know
2. ls alkaline injury more dangerous than Acid?
   (a)Agree
   (b)Disagree
   (c)Don't know
3. Can chemical injury cause eye complication?
   (a)Agree
   (b)Disagree
   (c)Don't know
4. Can you locate and remove particles in the eye in case of chemical injury?
   (a)Yes
   (b) No
   (c) Don't know
5. What is the earliest symptom of chemical eye injury?
   (a) Burning sensation of the eye
   (b) Pain in the eye
   (c) Redness of the eye
   (d) Don't know
6. What is the most urgency sign of chemical eye injury?
   (a) Whitish of the eye
   (b) Redness of the eye
   (c) Don't know

7.Which liquid should you use to wash the eye with acid chemical injury?

(a) wash with alkali

(b)wash with water

(c) wash with Alcohol

(d) I don't know

8.Which liquid should you use to wash the eye with alkali chemical injury?

(a) wash with acid

(b)wash with water

(c) wash with Alcohol

(d) I don't know

8. What is the first step you take when you or your co-worker have exposed to chemical eye injury?

(a) Take him or her immediately to hospital

(b) Cover the eye

(c) Wash with plenty of water

(d) Wash with little water

(e) Provide eye drops from pharmacy

If he or she answered C proceed with next Qns but if other choice is selected end here.

9. What is minimum amount of water used?

(a) 0.25L

(b) 0.5L

(C) 1L

(d) Don't know

10. What is the minimum duration is used for irrigation?

(a) 5min

(b) 15min

(c) 30min

(d) Don't know

SECTION C

TO DETERMINE THE FACTORS ASSOCIATED WITH KNOWLEDGE ON FIRST AID OF CHEMICAL EYE INJURY.

11. Years of work at industry

a. Less than 1 year
b. 1 to 3 year
c. 4 to 5
d. More than 5 years

12. Source of information on first aid management of chemical eye injuries

a) Family and friends
b) Radio and tv
c) Magazine
d) Occupational safety educators

13. Attendance to any First aid training on chemical eye injjuries

a) Yes
b) No

14.Any first aid provision participation to a victim of chemical eye injury

a. Yes
b. No

Appendix Iv: Swahili Version Questionnaire

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCE

SCHOOL OF MEDICINE

OPHTHALMOLOGY DEPARTMENT

RESEARCH QUESTIONNAIRE TO ASSES KNOWLEDGE ON FIRST AID OF CHEMICAL EYE INJURIES AND ASSOCIATED FACTORS AMONG CHEMICAL INDUSTRIAL WORKERS IN DAR ES SALAAM.

Questionnaire no ……

Date ……

Name of the industry……..

SEHEMU A:

TAARIFA BINAFSI NA ZA KIJAMII**:**

1. Umri wa mshiriki

   <18

   18-30

   31-40

   >40

2. Jinsi

   (a) Me

   (b) Ke

3. Hali yako ya ndoa
    (a) Nimeolewa/ Nimeoa
    (b) Sijaolewa/ Sijaoa
    (c) Kukaa pamoja
    (d) Mjane/Mgane
    (e) Mtarakiwa
4. Kiwango cha elimu
    (a) Shule ya msingi
    (b) Shule ya sekondari
    (c) Mwanafunzi wa chuo
    (d) Astashahada/ Stashahada
    (e) Shahada/ Shahada ya uzamili
5. Aina ya kazi unayofanya kiwandani
    a) Muendesha mashine
    b) Mkemia/mwanasayansi
    c) Mbeba mizigo
    d) Utawala
    e) Nyingine……..
6. Ushawahi kupata ajali ya kumwagikiwa na kemikali kwenye macho?
    (a) Ndiyo
    (b) Hapana
7. Ushawahi kushuhudia mtu aliyepata ajali ya kumwagikiwa na kemikali machoni?
    (a) Ndiyo
    (b) Hapana

SEHEMU B:

TO DETERMINE THE KNOWLEDGE ON FIRST AID OF CHEMICAL EYE INJURY

1. Ni aina gani ya kemikali inayosababisha ajali kwenye macho mara nyingi?
    (a) Asidi
    (b) Bezi
    (c) Sijui
2. Je Bezi ni hatari kuliko asidi?
    (a) Ndiyo
    (b) Hapana
    (c) Sijui
3. Je kumwagikiwa na kemikali kwenye macho kunaweza kusababisha matatizo kwenye macho?
    (a) Ndiyo
    (b) Hapana
    (c) Sijui
4. Ni dalili gani ya haraka mtu huwanayo akipata ajali ya kumwagikiwa na kemikali kwenye macho?
    (a) Kuhisi kuungua kwa macho
    (b) Maumivu kwenye macho
    (c) Macho kuwa mekundu
    (d) Sijui
5. Je ni alama gani huonyesha hatari zaidi kwa mtu aliyemwagikiwa na kemikali kwenye macho?
    a) Jicho kuwa jeupe
    b) Jicho kuwa jekundu
    c) Sijui
6. Je Unapaswa kuondoa chembechembe machoni umwagikiwapo na kemikali?
    (a) Ndiyo
    (b) Hapana
    (c) Sijui

7.Ni kimiminika kipi utatumia kuosha jicho lililomwagikiwa na asidi

a) Osha kwa bezi
b) Osha kwa maji
c) Osha kwa pombe
d) sijui

8.Ni kimiminika kipi utatumia kuosha jicho lililomwagikiwa na bezi

a) Osha kwa asidi
b) Osha kwa maji
c) Osha kwa pombe
d) sijui

9.ni hatua gani ya kwanza huchukua pale wewe au mfanyakzi mwenzio kamwagikiwa na kemikali machoni.

a) Kumpeleka hospitali moja kwa moja
b) Kulifunika jicho
c) Kuliosha jicho kwa maji mengi
d) Kumpa dawa ya matone kutoka duka la dawa

Kama kajibu c endelea lakni kama kajibu mengine ishia hapa

10.Ni kiasi gani cha maji huhitajika

a) Lita 0.25
b) Lita 0.5
c) Lita 1
d) sijui

11.Ni kwa muda gani unapaswa kuliosha jicho

a) dakika 5
b) dakika 15
c) dakika 30
d) sijui

SEHEMU C.

TO DETERMINE THE OTHER FACTORS ASSOCIATED WITH KNOWLEDGE ON FIRST AID MANAGEMENT OF CHEMICAL EYE INJURY.

11. Miaka uliyofanya kazi kiwandani

a) chini ya mwaka mmoja
b) miaka 1 hadi 3
c) 4 hadi 5
d) Zaidi ya miaka 5

12. Chanzo cha taarifa juu ya ajali za kemikali machoni

a) Familia na marafiki
b) Redio na tv
c) Magazeti
d) Waelimishaji juu ya ajali za kazini

13. umewahi huzulia mafunzo yoyote ya huduma ya kwanza kwa aliemwagikiwa chemikali machoni

a) Ndio
b) hapana

14.Umewahi shriki kuhudumia mtu aliemwagikiwa kemikali machoni

a. ndio
b. hapana

Appendix V: Ethical Clearances

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATION

Ref. No.DA.282/298/01.C/1918 Date: 18/09/2023

MUHAS-REC-09-2023-1918
JOHN MPANDE CHARLES
SCHOOL OF MEDICINE
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: KNOWLEDGE ON FIRST AID MANAGEMENT OF CHEMICAL EYE INJURIES AND ASSOCIATED FACTORS AMONG WORKERS FROM CHEMICAL INDUSTRIES IN DAR ES SALAAM.

Reference is made to the above heading,
I am pleased to inform you that the Chairperson has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 18/09/2023
EXPIRATION DATE OF APPROVAL: 18/09/2024

STUDY DESCRIPTION:
Purpose:
Aim: The aim of this study is to assess knowledge on first aid management of chemical eye injuries and associated factors among chemical industrial workers in Dar es Salaam.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided:
https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2014844.pdf and in the MUHAS archives.

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain data transfer agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain material transfer agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country,
8. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
9. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
10. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.

Dr. Nahya Salim Masoud,

Chairperson, MUHAS Research and Ethics Committee



Appendix Vi: Introduction Letter

UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

Ref. No. HD/MUH/T.140/2021

6th December, 2022

CHIEF EXECUTIVE OFFICER,
BUSINESS REGISTRATION AND LICENCING AGENCY,
P.O BOX 9393,
DAR ES SALAAM.

RE: INTRODUCTION LETTER

The bearer of this letter is John Mpande Charles (HD/MUH/T.140/2021), a student at Muhimbili University of Health and Allied Sciences (MUHAS) pursuing MMed Ophthalmology.

As part of his studies he intends to do a study titled: ***"Knowledge on First Aid Management of Chemical Eye Injuries and Associated Factors Among Workers From Chemical Industries in Dar es Salaam".***

The research has been approved by the Chairman of University Senate.

Kindly provide him with the necessary assistance to facilitate the conduct of his research.

We thank you for your cooperation.

Ms. Victoria Mwanilwa
For: DIRECTOR, POSTGRADUATE STUDIES

cc: Dean, School of Medicine, **MUHAS**
cc: John Mpande Charles

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